

CET (PG)–2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Two Year Course)-Nuclear Medicine

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

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2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
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4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
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16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

M.Sc. (Two Year Course)-Nuclear Medicine/A

- 1. A radiopharmaceutical with a 6 hour physical half life and a 3 hour biological half life has an effective half life of how many hours ?**
(A) 4 (B) 3
(C) 2 (D) 1
- 2. What is released from the nucleus during electron capture decay ?**
(A) Alpha particle (B) Beta particle
(C) Neutron (D) Neutrino
- 3. The half life of ^{113m}In in minutes is:**
(A) 100 (B) 200
(C) 300 (D) 400
- 4. What are the energy limits of a 10% window centred at 140 KeV principal gamma energy of ^{99m}Tc in a pulse height analyzer ?**
(A) 123 to 137 KeV (B) 133 to 147 KeV
(C) 143 to 157 KeV (D) 153 to 167 KeV
- 5. The gastric emptying time of water in a normal person in minutes is :**
(A) 10–15 (B) 20–25
(C) 30–35 (D) 40–45
- 6. Which of the following releases lactoferrin ?**
(A) Bacteria (B) Viruses
(C) Fungus (D) Leukocytes
- 7. The range of triiodothyronine hormone in systemic circulation of a normal adult is :**
(A) 80–220 pg (B) 80–220 ng
(C) 80–220 ug (D) 80–220 mg
- 8. The principal gamma ray energy of ^{201}Tl is :**
(A) 147 KeV (B) 157 KeV
(C) 167 KeV (D) 177 KeV

- 9. The kidneys receive approximately what percentage of cardiac output ?**
(A) 5% (B) 15%
(C) 25% (D) 35%
- 10. Which of the following has least frequency ?**
(A) Radio waves (B) X-rays
(C) Light waves (D) Ultraviolet waves
- 11. Most abundant protein in the human blood plasma :**
(A) Hemoglobin (B) Lactoferrin
(C) Collagen (D) HSA
- 12. Which one of the following is not a steroid ?**
(A) Prednisolone (B) Ergosterol
(C) Tetraiodothyronine (D) Progesterone
- 13. Glycogen is a :**
(A) Protein (B) Polysaccharide
(C) Hormone (D) Nucleotide
- 14. Myelin is made up of :**
(A) Proteins (B) Lipids
(C) Carbohydrates (D) Proteins and Lipids
- 15. Which of the following does not cross blood-brain barrier ?**
(A) Fluorodopa (B) DTPA
(C) IMP (D) ECD
- 16. Which of the following is generally used for renal imaging ?**
(A) DTPA (B) Thallous Chloride
(C) Sestambi (D) Indium Chloride
- 17. How much of cardiac output passes through coronary circulation ?**
(A) 5% (B) 10%
(C) 15% (D) 20%

18. Nearly how much of organic matrix constitute dry weight of bone ?

- (A) 20% (B) 30%
(C) 40% (D) 50%

19. Radionuclide ^{131}I is a :

- (A) Alpha emitter (B) Beta emitter
(C) Gamma emitter (D) Gamma and Beta emitter

20. The half life of ^{186}Re is :

- (A) 3.8 sec (B) 3.8 min
(C) 3.8 hours (D) 3.8 days

21. Diabetes insipidus is caused due to the deficiency of which of the following ?

- (A) Antidiuretic hormone (B) Thyroxine
(C) Aldosterone (D) Testosterone

22. The number of hydrogen bonds formed by a single water molecule at 0°C :

- (A) 1 (B) 2
(C) 3 (D) 4

23. In case of X-rays :

- (A) Soft tissue is more transparent than bone
(B) Bone is more transparent than soft tissue
(C) Soft tissue and bone both are transparent
(D) Soft tissue and bone both are not transparent

24. Siderophores are produced from :

- (A) Eosinophils (B) Bacteria
(C) RES cells (D) Glial cells

25. Imaging in Nuclear Medicine generally requires :

- (A) UV Rays (B) X-Rays
(C) Gamma Rays (D) Beta Rays

26. Which of the following is not a bifunctional chelating agent ?
- (A) DTPA (B) N_2S_2
 (C) Metallothionein (D) MAG3
27. Which of the following is used for radioiodination ?
- (A) EDTA (B) Iodogen
 (C) DOTA (D) Ethyl Cysteinate Dimer
28. During severe exercise, the coronary blood flow in a normal man of 60kg weight, increase up to :
- (A) 0.5 lit/min (B) 1.0 lit/min
 (C) 2 lit/min (D) 3 lit/min
29. Which of the following is not a positron emitter ?
- (A) ^{11}C (B) ^{18}F
 (C) ^{67}Ga (D) ^{68}Ga
30. Iodine is taken up by the thyroid gland by :
- (A) Active transport (B) Passive transport
 (C) Diffusion (D) Filtration
31. The molecular weight of the radiopharmaceutical expressed in amu, for the purpose of imaging should not be greater than :
- (A) 30 k (B) 40 k
 (C) 50 k (D) 60 k
32. The value of SI unit of exposure in $\mu C/Kg$ in air is :
- (A) 258 (B) 25.8
 (C) 2.58 (D) 0.258
33. Positron is anti-particle of :
- (A) Neutron (B) Proton
 (C) Electron (D) Neutrino
34. The maximum permissible limit of annual dose expressed in mSv from radioactive exposure for the non occupational worker is :
- (A) 1 (B) 5
 (C) 10 (D) 15

- 35. Fourier transformation modality is not used in :**
(A) Liquid scintillation detection (B) MRI
(C) CT Imaging (D) SPECT
- 36. Which of the following helps in increasing gene expression in a mouse model ?**
(A) Knock in (B) Knock out
(C) Transgenic (D) Partial Knockout
- 37. How much of the human genome is actual protein-encoding genes ?**
(A) 1 (B) 5
(C) 10 (D) 15
- 38. When a solute is moved against a concentration gradient using energy, the process is called ?**
(A) Diffusion (B) Passive transport
(C) Active transport (D) Osmosis
- 39. Labeling a stretch of DNA as per its function is :**
(A) Recombinant DNA technology (B) Screening
(C) Methylation (D) Annotation
- 40. Immunoprecipitation involves the purification of :**
(A) Antibodies (B) Antigen
(C) Antigen and Antibodies (D) Antigen and Antibodies complex
- 41. The resolution of TEM is :**
(A) 0.2 nm (B) 0.2Å
(C) 0.2 μ (D) 0.2 pm
- 42. Which route is required to be followed for slower absorption of the carcinogen to be administered to animals ?**
(A) Intravenous (B) Intraperitoneal
(C) Intramuscular (D) Subcutaneous
- 43. Which of the following forces is unfavourable for protein folding ?**
(A) Hydrogen Bonding (B) Conformational Entropy
(C) Van der Waals Interactions (D) Hydrophobic Interactions
- 44. In Transmission Electron Microscope, the electrons travel through a tube which contains :**
(A) Argon Gas (B) Air
(C) Quenching Gas (D) Neither air nor gas

45. Hypersensitivity reactions are associated with which of the following immunoglobulins ?
(A) IgA (B) IgD
(C) IgE (D) IgM
46. Principal gamma ray energy of ^{113m}In expressed in KeV, is :
(A) 92 (B) 192
(C) 292 (D) 392
47. Physical half life of ^{123}I , is :
(A) 1.32 hr (B) 13.2 hr
(C) 1.32 days (D) 13.2 days
48. Which type of radiations are emitted by the disintegration of ^{35}S ?
(A) Gamma (B) Beta positive
(C) Beta negative (D) Auger electrons
49. The length of one turn of DNA expressed in \AA , is
(A) 0.034 (B) 0.34
(C) 3.4 (D) 34
50. DNA is present in :
(A) Nucleus only (B) Nucleolus only
(C) Nucleus and Mitochondria (D) Nucleus, Mitochondria and Chloroplast
51. Which of the following influences the rate of migration of a protein in a gel ?
(A) Electrical field, only
(B) Charge on ionic species, only
(C) Coefficient of support matrix, only
(D) Electrical field, Charge on ionic species and Coefficient of support matrix
52. Thyroid stimulating hormone is secreted from :
(A) Thyroglobulins (B) Thyroid follicles
(C) Cells of thyroid (D) Pituitary
53. Which of the following is not used in Radioimmunoassay ?
(A) Antigen (B) Antibodies
(C) Radiolabel Antigen (D) Radiolabel Antibodies

- 54. Which is not recommended during DNA transfection ?**
(A) Calcium phosphate (B) Electroporation
(C) Antibiotics (D) Viruses
- 55. Glucose transport across the plasma membrane is a type of :**
(A) Simple passive transport (B) Osmosis
(C) Simple active transport (D) Facilitated diffusion
- 56. Two-dimensional gel electrophoresis is usually run to carry out the separation of :**
(A) Proteins (B) DNA fragments
(C) RNA fragments (D) Both DNA and RNA fragments
- 57. The precursor of serotonin is :**
(A) Histidine (B) Aspartic acid
(C) 5-Hydroxytryptophan (D) Tyrosine
- 58. Which of the following has the shortest range in biological tissue ?**
(A) Thermal neutrons (B) Fast neutrons
(C) Alpha particles (D) Positrons
- 59. Which of the following has highest radiation weighing factor ?**
(A) Electron (B) 2 MeV neutrons
(C) 20 MeV neutrons (D) Protons
- 60. When sound waves travel from air to biological tissue, its velocity :**
(A) Decrease (B) Increase
(C) Remains unchanged (D) May change at the end of range
- 61. The damage to a biological tissue from an internally deposited radionuclide is more from :**
(A) Gamma Rays (B) Brehmsstrahlung Radiations
(C) High Energy Protons (D) Heavy Ions
- 62. At what temperature, the Celsius and Fahrenheit scales are the same ?**
(A) - 40 degrees (B) - 10 degrees
(C) 0 degree (D) 20 degrees

- 63. Chromosomes exhibit minimum coiling during :**
- (A) Interphase (B) Prophase
(C) Metaphase (D) Telophase
- 64. Which of the following is effectively used for staining Chromosomes ?**
- (A) Eosin (B) Schiff Reagent
(C) Acetocarmine (D) Methylene blue
- 65. The rate of DNA synthesis can be studied by using :**
- (A) ^{14}C -u-Glucose (B) ^{14}C Uracil
(C) ^3H Leucine (D) ^3H Thymidine
- 66. During transcription, which of the following is used ?**
- (A) RNA Polymerase (B) RNAase
(C) DNA polymerase (D) Peroxidase
- 67. The average binding energy of nucleons for most nuclides is in the range :**
- (A) 0.5–0.8 ev (B) 5–8 ev
(C) 5–8Kev (D) 5–8 Mev
- 68. 50 micro Curie of radioactivity corresponds to**
- (A) 0.0185 MBq (B) 0.185 MBq
(C) 1.85 MBq (D) 18.5 MBq
- 69. POPOP is used in a liquid scintillation counter :**
- (A) To contain quenching
(B) To transfer primary beta particle energy
(C) To shift the wavelength of primary scintillation
(D) To enhance quenching
- 70. The decay factor of ^{99}Mo at 34 hours shall be :**
- (A) 0.00699 (B) 0.0699
(C) 0.699 (D) 6.99
- 71. Pyrogen testing is done by**
- (A) ITLC (B) Immunoelectrophoresis
(C) LAL test (D) SDS-PAGE

72. Nucleons are heavier than electrons by :

- (A) 20 times (B) 200 times
(C) 2000 times (D) 20000 times

73. ^{32}P is used in :

- (A) Imaging of Bones (B) Measurement of extracellular volume
(C) Treatment of Leukemia (D) Treatment of leukemia and polycythemia Vera

74. One millicurie of ^{177}Lu after 14 hours shall be :

- (A) 0.94 millicurie (B) 0.74 millicurie
(C) 0.64 millicurie (D) 0.54 millicurie

75. Which of the following is used in auto radiographic studies ?

- (A) ^{201}Tl (B) ^{133}Xe
(C) ^3H (D) $^{99\text{m}}\text{Tc}$

ROUGH WORK

CET(PG)-2016

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Environment Science)

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

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1. Aurora borealis are occasionally seen in which of the following layers of atmosphere ?

- (A) Troposphere (B) Thermosphere
(C) Mesosphere (D) Exosphere

2. The species restricted to a particular area are known as _____ species.

- (A) Epidemic (B) Localized
(C) Endemic (D) Pandemic

3. Which among the following is not a natural disaster ?

- (A) Landslide (B) Earthquake
(C) Cyclone (D) Snowfall

4. Which among the following is a non-conventional energy resource ?

- (A) Natural gas (B) Petroleum
(C) Coal (D) Tidal power

5. In which of the following layers of atmosphere meteors burn up while entering the atmosphere ?

- (A) Stratosphere (B) Thermosphere
(C) Mesosphere (D) Exosphere

6. Minamata disease is caused due to pollution of water with :

- (A) Cr(VI) (B) Hg
(C) Pb(II) (D) As(III)

7. Which of the following is not a vector-borne disease ?

- (A) Elephantiasis (B) Malaria
(C) Influenza (D) Sleeping sickness

8. Which of the following relates to Convention on Climate Change ?

- (A) Brundtland Commission (B) Ramsar Convention
(C) Kyoto Protocol (D) Montreal Protocol

- 9. The Fly Ash Mission (FAM) of Government of India was started in the year :**
- (A) 1994 (B) 1998
(C) 2004 (D) 2008
- 10. Which among the following cities has the maximum population density ?**
- (A) Chandigarh (B) Patiala
(C) Jalandhar (D) Amritsar
- 11. Argon in the atmosphere constitutes only _____ %.**
- (A) 0.93 (B) 1.93
(C) 2.93 (D) 4.93
- 12. International Space Stations orbits in which of the following layers of atmosphere ?**
- (A) Stratosphere (B) Mesosphere
(C) Thermosphere (D) Exosphere
- 13. Cartagena protocol is a supplement to :**
- (A) Convention on Biological Diversity (B) Vienna Convention
(C) Kyoto Protocol (D) Brundtland Commission
- 14. Areas are known to suffer from water logging when depth of groundwater is between :**
- (A) 0-2 m (B) 3-5 m
(C) 5-10 m (D) 10-15 m
- 15. The silent valley having rare plants and animals is located in :**
- (A) Tamil Nadu (B) Andhra Pradesh
(C) Karnataka (D) Kerala
- 16. Earth Summit 2012 was held at :**
- (A) Canary Islands (B) Rio de Janeiro
(C) Stockholm (D) Johannesburg
- 17. SPM stands for :**
- (A) Suspended Public Material (B) Suspended Particulate Matter
(C) Suspended Particulate Material (D) Suspended Public Matter

18. A sound becomes noise :

- (A) Above 120 dB (B) Above 100 dB
(C) Above 80 dB (D) Above 30 dB

19. The scientific study of human population is called as :

- (A) Human geography (B) Population density
(C) Dendrochronology (D) Demography

20. Every year, World Population Day is celebrated on :

- (A) June 11 (B) July 11
(C) August 11 (D) September 11

21. CNG stands for :

- (A) Compact Nobel Gas (B) Compressed Natural Gas
(C) Compact Natural Gas (D) Compressed Nobel Gas

22. The movement of surface water down a slope resulting in removal of uniform soil peels is known as :

- (A) Contour erosion (B) Rill erosion
(C) Sheet erosion (D) Gully erosion

23. Ozone is a friend in :

- (A) Troposphere (B) Stratosphere
(C) Mesosphere (D) Ionosphere

24. Which among the following indoor pollutants causes mental retardation in children ?

- (A) Carbon monoxide (B) Asbestos
(C) Lead (D) Mercury

25. Which of the following is a natural flavour enhancer ?

- (A) Sodium benzoate (B) Monosodium glutamate
(C) Sunset Yellow 3 (D) Aspartame

26. Which of the following is an antioxidant ?

- (A) Sucralsoe (B) Butylated hydroxyanisole
(C) Acrylamide (D) Monosodium glutamate

- 27. Which of the following pollutants irritates mucous membrane ?**
- (A) SPM (B) NO_x
(C) CO (D) Aerosols
- 28. AIDS is caused by :**
- (A) Mycoplasma (B) Virus
(C) Bacteria (D) Bacteriophage
- 29. Which of the following is common food allergen ?**
- (A) Pollens (B) Shellfish
(C) Neem oil (D) Mustard oil
- 30. India's National population policy was framed in :**
- (A) 1996 (B) 1998
(C) 2000 (D) 2002
- 31. National Slum Development Programme of India started in :**
- (A) 1993 (B) 1994
(C) 1995 (D) 1996
- 32. Human population exhibits _____ Curve.**
- (A) Binomial (B) J-shaped
(C) S-shaped (D) Exponential
- 33. Avian Influenza is a type of _____ disease.**
- (A) Localized (B) Epidemic
(C) Endemic (D) Pandemic
- 34. Which among the following is not a non-renewable source of energy ?**
- (A) Wind (B) Gas
(C) Petrol (D) Coal
- 35. The Chipko movement was first started in :**
- (A) Madhya Pradesh (B) Tehri Garhwal
(C) West Bengal (D) Orissa

- 36. Every year, World Environment Day is celebrated on :**
- (A) March 22 (B) April 22
(C) May 22 (D) June 5
- 37. Which of the following is not a contagious disease ?**
- (A) Hepatitis (B) Tuberculosis
(C) Small pox (D) Influenza
- 38. Which amongst the following relates to the concept of *sustainable development* ?**
- (A) Vienna Convention (B) Brundtland Commission
(C) Montreal Protocol (D) Stockholm Summit
- 39. Which of the following best explains the fishless lakes in Sweden ?**
- (A) Acid rain (B) Overfishing
(C) Dumping of sewage wastes in lakes (D) Pesticide dumping
- 40. The population explosion results from :**
- (A) Low birth rate and high death rate (B) High birth rate and low death rate
(C) High birth and death rate (D) Low birth and death rate
- 41. Which of the following is responsible for softening of water ?**
- (A) Ozonolysis (B) Ion Exchange
(C) Chlorination (D) Coagulation
- 42. Fluoridation of water is done to :**
- (A) Correct hardness (B) Kill harmful Pathogens
(C) Prevent dental caries (D) Add taste
- 43. The declaration on *Health for all by 2000 AD* was made at:**
- (A) Alma Ata (B) Washington
(C) Stockholm (D) Rio de Janeiro
- 44. Which of the following is the most potent indicator of development of a society ?**
- (A) Population (B) Job Prospects
(C) Human Health (D) Environmental Awareness

- 45. Anabolic steroids are artificial version of which of the following hormones ?**
- (A) Adrenalin (B) Insulin
(C) Testosterone (D) Progesterone
- 46. Which of the following diseases is not caused by bacteria ?**
- (A) Cholera (B) Diabetes
(C) Pertussis (D) Diphtheria
- 47. In India, population census is carried out by the Ministry of :**
- (A) Finance (B) Home Affairs
(C) Social (D) Health and Family Planning
- 48. The specialization of homologous organs to perform variety of functions is :**
- (A) Parallel evolution (B) Adaptive radiation
(C) Convergent evolution (D) Natural selection
- 49. The Great Indian Bustard falls in which of the following categories ?**
- (A) Vulnerable (B) Data Deficient
(C) Critically Endangered (D) Conservation dependent
- 50. Marijuana relates to :**
- (A) Poppy (B) Coffee
(C) Cannabis (D) Tea
- 51. A type of fermentation in which conditions are not changed from outside is _____ .**
- (A) Open (B) Continuous
(C) Batch (D) Downstream
- 52. Which of the following is a secondary air pollutant ?**
- (A) SO₂ (B) VOC
(C) PAN (D) CO
- 53. Which of the following contributes maximum towards greenhouse effect ?**
- (A) CH₄ (B) H₂O vapours
(C) CO₂ (D) O₃

- 54. Who amongst the following gave the concept of *Biodiversity Hotspots* ?**
- (A) Ernst Haeckel (B) Roger Harper
(C) Norman Myers (D) E.O. Wilson
- 55. In which of the following years, Air (Prevention and Control of Pollution) Act of India was enacted ?**
- (A) 1979 (B) 1981
(C) 1983 (D) 1985
- 56. In which of the following years, The Project Elephant was launched ?**
- (A) 1988 (B) 1990
(C) 1992 (D) 1994
- 57. Succession starting from a salt rich marshy area is known as :**
- (A) Psammosere (B) Hydrosere
(C) Halosere (D) Mesosere
- 58. Which of the following national parks of India is famous for one-horned rhino ?**
- (A) Jim Corbett (B) Kaziranga
(C) Ranthambore (D) Periyar
- 59. In which of the following continents wetlands are absent ?**
- (A) Europe (B) Asia
(C) Antarctica (D) North America
- 60. Biodiversity Act of India was enacted in the year :**
- (A) 2003 (B) 2002
(C) 2000 (D) 2001
- 61. In which of the following Indian States is Lake Chilika located ?**
- (A) Punjab (B) Orissa
(C) Gujarat (D) Madhya Pradesh
- 62. Which of the following materials produce dioxins upon burning ?**
- (A) Paddy Straw (B) Crop Residues
(C) Waste Paper (D) Polythene

- 63. Kelps belong to which group of algae ?**
- (A) Red (B) Blue-green
(C) Green (D) Brown
- 64. The fossil Genus *Rhynia* is named after :**
- (A) Locality (B) Fossil type
(C) Scientist (D) Country
- 65. Who among the following proposed the Tunica-carpus theory of apical meristems ?**
- (A) Hanstein (B) Guttenberg
(C) Schmidt (D) Esau
- 66. *Cycas revoluta* is commonly known as :**
- (A) Kentia Palm (B) Sago Palm
(C) Bottle Palm (D) Toddy Palm
- 67. Gram belongs to which of the following families ?**
- (A) Gramineae (B) Fabaceae
(C) Brassicaceae (D) Rosaceae
- 68. Which type of fruit is found in oranges ?**
- (A) Hesperidium (B) Berry
(C) Pepo (D) Drupe
- 69. The start codon of mRNA always codes for which of the following amino acids ?**
- (A) Methionine (B) Isoleucine
(C) Alanine (D) Serine
- 70. Lac operon was first discovered by :**
- (A) Watson and Crick (B) Beadle and Tatum
(C) Jacob and Monod (D) Hershey and Chase
- 71. Which of the following is true about Cyclic photophosphorylation ?**
- (A) It involves both Photosystems I and II
(B) It involves Photosystem II only
(C) It involves Photosystem I only
(D) It involves either Photosystem I or Photosystem II

- 72. Every year, World Wetland Day is celebrated on _____ .**
- (A) February 2 (B) March 2
(C) April 2 (D) May 2
- 73. Which of the following enzymes unwind the DNA double helix ?**
- (A) Polymerase (B) Helicase
(C) Ligase (D) Primase
- 74. Which of the following are not known as the rainforests by the sea ?**
- (A) Mangroves (B) Coral reefs
(C) Tidal forests (D) Tidal swamp forests
- 75. The seeds of which of the following trees are known as Chilgoza ?**
- (A) *Pinus longifolia* (B) *Pinus kesiya*
(C) *Pinus roxburghii* (D) *Pinus gerardiana*

ROUGH WORK

CET(PG)-2016

Question Booklet Series : A

Sr. No. :

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Hons. School/2 Year Course)-Zoology

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
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15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent / Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **Which of the following types of DNA replication or repair systems is dysfunctional in individuals with Xeroderma pigmentosum ?**
(A) Mismatch repair (B) Base excision repair
(C) Nucleotide excision repair (D) DNA helicase
2. **Nebenkern, a sheath on either side of axial filament in a spermatid is formed by :**
(A) Golgi body (B) Centriole
(C) Mitochondria (D) Nucleolus
3. **The mechanism of signal transduction by steroid hormones differs from amine and peptide hormones because :**
(A) Steroids use small, water soluble second messengers
(B) They bind with specific receptor proteins on target cell plasma membranes
(C) They are secreted from exocrine glands
(D) They bind to cytoplasmic or nuclear receptors and affect gene expression
4. **During fertilization, polyspermy is prevented by :**
(A) Cortical granules in the presence of Ca^{2+} and Na^+ ions
(B) Zona pellucida in the presence of Na ions
(C) Vitelline membrane in the presence of Ca^{2+} ions
(D) Influx of Na^+ , Ca^{2+} and Mg^{2+} ions
5. **The part of the embryo from which ectoderm, endoderm and mesoderm are formed in chick is known as :**
(A) Primitive streak (B) Hypoblast
(C) Cytotrophoblast (D) Epiblast
6. **Which of the following is not associated with insulin action ?**
(A) Increased glucose transport (B) Increased glycogen formation
(C) Enhanced lipolysis in adipose tissue (D) Decreased rate of gluconeogenesis

7. **Which two sub-cellular compartments have same pH and electrolyte composition ?**
- (A) Cytosol and lysosomes
 - (B) Cytosol and mitochondrial inter membrane space
 - (C) Cytosol and endosome
 - (D) Mitochondrial matrix and inter membrane space
8. **N-linked oligosaccharides on secreted glycoproteins are attached to :**
- (A) Nitrogen atoms in the polypeptide backbone
 - (B) The serine or threonine in the sequence Asn-X-Ser/Thr
 - (C) The amino terminus of the protein
 - (D) The asparagines in the sequence Asn-X-Ser-/Thr
9. **Which of the following in star fish can turn inside out ?**
- (A) Madreporite
 - (B) Stone canal
 - (C) Tube feet
 - (D) Cardiac stomach
10. **The activation of dorsalizing determinants in the vegetal cells of the embryo is related to :**
- (A) Nieuwkoop center
 - (B) Spemann-Mangold organiser
 - (C) Radical fringe
 - (D) Apical ectodermal ridge
11. **Which hormone is NOT secreted by Leydig cells ?**
- (A) Testosterone
 - (B) Androstenedione
 - (C) Dehydroepiandrosterone
 - (D) Anti Mullerian hormone
12. **Which term denotes abnormally slow breathing ?**
- (A) Apnea
 - (B) Eupnea
 - (C) Tachypnea
 - (D) Bradypnea
13. **Antennae in hymenoptera, diptera and odonata are :**
- (A) Short & filiform, aristate, geniculate respectively
 - (B) Short & filiform, geniculate, aristate respectively
 - (C) Geniculate, aristate, short & filiform respectively
 - (D) Aristate, geniculate, short & filiform respectively

- 14. A lectotype is :**
- (A) One of the holotypes (B) One of the paratypes
(C) One of the syntypes (D) One of the allotypes
- 15. In which of the following groups of animals the germ cells migrate through blood stream ?**
- (A) Amphibians and birds (B) Birds and mammals
(C) Reptiles and birds (D) Amphibians and reptiles
- 16. Heterochromatin contains :**
- (A) Small amounts of DNA and large amounts of RNA
(B) Large amount of DNA only
(C) Both RNA and DNA in equal amounts
(D) Varying composition of DNA and RNA
- 17. “Gene battery model” of gene regulation in eukaryotes was proposed by :**
- (A) Kornberg and Ochoa (B) Britten and Davidson
(C) Beadle and Tatum (D) Jacob and Monod
- 18. Parasite which may be transmitted by sexual contact is :**
- (A) *Trichomonas vaginalis* (B) *Trypanosoma cruzi*
(C) *Leishmania donovani* (D) *Entamoeba histolytica*
- 19. Mammalian jaw has evolved from :**
- (A) Pharyngeal arches (B) Temporal bone
(C) Frontal bone (D) Dentary and squamosal bones
- 20. In signal transduction, trimeric G protein with α , β and γ is involved. Which subunit will activate adenylate cyclase ?**
- (A) α subunit (B) $\alpha \beta$ subunit
(C) β subunit (D) γ subunit
- 21. The function of nonsense codons is :**
- (A) To release polypeptide chains from the tRNA molecule
(B) To form unspecified amino acids
(C) To determine the messages for the gene controlled protein synthesis
(D) To assist the protein synthesis

- 22. During interphase of mitosis which other organelles along with DNA replicate ?**
- (A) RNA (B) Centriole
(C) Nucleolus (D) Mitochondria
- 23. A woman had a rare abnormality of eyelids called ptosis which depends on single dominant gene (P). The woman's father had ptosis but her mother had normal eyelids. What are the probable genotypes of the woman, her mother and father respectively ?**
- (A) PP, Pp and pp (B) Pp, pp and PP
(C) Pp, Pp and Pp or PP (D) Pp, pp and Pp or PP
- 24. The advantage arising out of the biconcave nature of mammalian red blood cell will be :**
- (A) Enlargement of pores in the cell membrane for the release of waste products
(B) To increase its life span
(C) Increase in the surface area for efficient gaseous exchange
(D) To accommodate more organelles in the cytoplasm
- 25. Hydrogen peroxide metabolism in an animal cell is carried out in the :**
- (A) Endoplasmic reticulum (B) Nucleolus
(C) Mitochondria (D) Peroxisomes
- 26. The nucleolus is also known as plasmasome when :**
- (A) It lacks a definitive nuclear membrane
(B) It is formed of oxychromatin
(C) It lacks chromatin
(D) It is formed of basichromatin
- 27. If a cell homogenate is subjected to centrifugation, the order in which the cellular components would sediment from bottom to top is**
- (A) nuclei, mitochondria, ribosome, microsome
(B) mitochondria, nuclei, ribosome, microsome
(C) ribosomes, microsomes, mitochondria, nuclei
(D) nuclei, mitochondria, microsomes, ribosomes

28. Which of the following is noted for its luminescence ?
- (A) *Giardia* (B) *Volvox*
 (C) *Noctiluca* (D) *Trichomonas*
29. Who wrote the book 'Systema Naturae' ?
- (A) Lamarck (B) Hippocrates
 (C) Aristotle (D) Carolus Linnaeus
30. More or less ring shaped circular or horse shoe shaped coral reef partly or wholly enclosing a central lagoon is called :
- (A) Barrier reef (B) Coral island
 (C) Fringing reef (D) Atoll
31. Which of the following genus is the blood fluke of man and other animals ?
- (A) *Schistosoma* (B) *Ophisthorchis (Clonorchis)*
 (C) *Paragonimus* (D) *Diplozoon*
32. Which of the following group of systems are absent in platyhelminthes ?
- (A) Skeletal, circulatory, digestive (B) Respiratory, excretory and digestive
 (C) Digestive, nervous and reproductive (D) Skeletal, respiratory and circulatory
33. Ectoparasitic worms with several suckers and hooks on opisthaptor are included in the class :
- (A) Digenea (B) Cestoda
 (C) Turbellaria (D) Monogenea
34. Which of the following characters does not imply the class nematodes ?
- (A) Epidermis forms four longitudinal chords (B) Pseudocoel is present
 (C) Eggs are fertilized externally (D) There is no segmentation of the body
35. The disease characterized by itching of anus, inflammation of mucosa of colon and appendix is caused by :
- (A) *Ascaris* (B) *Ancylostoma*
 (C) *Oxyuris* (D) *Enterobius*
36. Crustacean arthropods have respiratory organs as :
- (A) Trachea (B) Gills
 (C) Book lungs (D) General body surface

- 37. Which mollusc is the largest invertebrate ?**
- (A) Giant clam (B) Giant snail
(C) Giant squid (D) Giant octopus
- 38. The phylogenetic relationship of hemichordates and chordates is based on :**
- (A) Gill clefts and notochord (B) Segmentation and circulatory system
(C) Notochord and segmentation (D) Circulatory system and gill clefts
- 39. The lateral line system found in fish has been lost in amphibian because of :**
- (A) Development of sturdy legs
(B) Change over to herbivorous feeding
(C) Occurrence of metamorphosis in amphibian
(D) Evolution of terrestrial habitat
- 40. Which sub-class of animal possesses carapace and plastron ?**
- (A) Anapsida (B) Parapsida
(C) Synapsida (D) Diapsida
- 41. Hepatic piston is applicable to :**
- (A) Crocodiles (B) Tortoises
(C) Snakes (D) *Sphenodon*
- 42. The largest surviving reptile on the verge of extinction :**
- (A) *Alligator mississippiensis* (B) *Crocodylus porosus*
(C) *Gavialis* (D) Python
- 43. Madreporite is a structure characteristic of some members of :**
- (A) Eleutherozoa (B) Polyzoa
(C) Anthozoa (D) Madreporaria
- 44. Most evolved character in mammals is :**
- (A) Long nasal passage
(B) Warm blooded animal
(C) The diaphragm separates the body cavity into thoracic and abdominal cavity
(D) Body covered with hairs

- 45. Mammalian skull is :**
- (A) Acondylic (B) Monocondylic
(C) Dicondylic (D) Tricondylic
- 46. Presence of gullar pouch on throat is a characteristic of :**
- (A) Anseriformes (B) Gaviiformes
(C) Cuculiformes (D) Pelecaniformes
- 47. Pharyngeal and septal nephridia which are ectonephric type are adapted for :**
- (A) Conservation of water (B) Conservation of fat
(C) Conservation of temperature (D) Regulation of amino acids
- 48. Which part of the hair is dead and keratinized ?**
- (A) Bulb (B) Shaft
(C) Hair follicle (D) Dermal papilla
- 49. Placoid scales are found in :**
- (A) Primitive bony fish (B) In *Polypterus*
(C) Only in elasmobranchs (D) In ostracoderms
- 50. Interlocking arrangements are absent in :**
- (A) Contour feathers (B) Down feathers
(C) Filoplumes (D) Down and filoplume feathers
- 51. A shift in the oxygen hemoglobin dissociation curve to the right occurs in :**
- (A) Hypothermia
(B) Carboxyhemoglobin
(C) Fetal hemoglobin S
(D) An increase in 2, 3 bisphosphoglycerate
- 52. During a cardiac cycle :**
- (A) The volume of blood leaving the left side of the heart is greater than that leaving the right side
(B) The duration of diastole is greater than that of systole
(C) The pressure of the blood leaving the right side of the heart is greater than that leaving the left side
(D) The duration of systole is greater than that of diastole

- 53. Which of the following is not a function of liver ?**
- (A) Production of bile (B) Detoxification of drugs
(C) Storage of Vit. C (D) Storage of glucose
- 54. As blood passes along the glomerular capillaries from the afferent to efferent arteriole, the net filtration pressure :**
- (A) Increases
(B) Decreases
(C) First decreases, reaching a minimum about half way along the capillary, then increase
(D) First increases, reaching a maximum about half way along the capillary, then decreases
- 55. Trypsin differs from pepsin in that :**
- (A) Trypsin digest protein in acidic medium while pepsin does so in an alkaline medium
(B) Trypsin digest protein in alkaline medium while pepsin does so in an acidic medium
(C) Trypsin is secreted from the gastric glands while pepsin is secreted from the pancreas
(D) Trypsin production is influenced by peptidergic neurohormones while pepsin is influenced by steroids
- 56. Correct sequence of hormone secretion from beginning of mensuration is :**
- (A) FSH, Progesterone, estrogen (B) Estrogen, FSH, progesterone
(C) FSH, estrogen, progesterone (D) Estrogen, progesterone, FSH
- 57. In a statement, isotype is a duplicate specimen of X from the same collection of the same date and same locality, X stands for :**
- (A) Tototype (B) Holotype
(C) Paratype (D) Neotype
- 58. Populations that are morphologically similar but do not interbreed for physiological or behavioral reasons are grouped as :**
- (A) Races (B) Varieties
(C) Sub-species (D) Sibling species
- 59. Ecological equivalents describes :**
- (A) Group of species with comparable roles
(B) Species that occupy the same niche in different geographical regions
(C) Diversity of habitats
(D) Social behavior that enhance the fitness of other individuals in the population

- 60. A community with low species diversity but high dominance is said to be :**
- (A) Unproductive but stable (B) Productive but unstable
(C) Neither productive nor stable (D) Both productive and stable
- 61. A certain place in India has (i) average annual temperature of 27°C, (ii) annual rainfall between 200 and 300 cm, (iii) number of rainy days ranging from 115 to 150 cm. Which one of the following forest types would be found in such a place ?**
- (A) Tropical wet evergreen forest (B) Tropical dry deciduous forest
(C) Himalayan temperate forest (D) Moist alpine scrub
- 62. DDT has been banned from many developed countries because of its :**
- (A) High toxicity to mammals
(B) Low toxicity to insects
(C) High degree of persistence in the environment
(D) High solubility in water
- 63. The cranial capacity of which prehistoric human was almost the same as that of the modern man ?**
- (A) Neanderthal man (B) Peking man
(C) Java ape man (D) Australopithecus man
- 64. During evolution what would be the best reason why thymine replaced uracil in DNA ?**
- (A) Cytosine spontaneously deaminates to uracil
(B) Thymine synthetic pathway is easier
(C) Thymine is unstable
(D) Thymine has a stronger binding affinity for adenine than does uracil
- 65. The physical similarity of body shape in dolphins, sharks and penguins results from :**
- (A) Parallel evolution (B) Geographic isolation
(C) Convergent evolution (D) A property of common ancestor
- 66. Epiboly involves :**
- (A) Inward movement of macromeres
(B) Overgrowth of micromeres over macromeres
(C) Rapid proliferation of cells at the rim of the blastopore
(D) Invagination of cells at the blastopore

- 67. The isoelectric point of a protein is defined as :**
- (A) The pH at which the net charge on the molecule is zero
 - (B) The pH at which all groups are protonated
 - (C) The pH at which all groups are unprotonated
 - (D) The pH at which each acidic group is protonated and each basic group is unprotonated
- 68. Ketogenesis includes all except :**
- (A) Acetyl CoA acts as precursor
 - (B) HMG CoA synthase participate during reaction
 - (C) Occurs in liver
 - (D) Acetone is the only product
- 69. An example of competitive inhibition of an enzyme is the inhibition of :**
- (A) Succinic dehydrogenase by malonic acid
 - (B) Cytochrome oxidase by cyanide
 - (C) Hexokinase by glucose 6 phosphate
 - (D) Carbonic anhydrase by carbon dioxide
- 70. Pentose phosphate pathway is essential for the formation of :**
- (A) NADPH and amino acids
 - (B) Amino acids and nucleotides
 - (C) NADPH and nucleotides
 - (D) NADPH, amino acids and nucleotides
- 71. Within the endocrine system, specificity of communication is determined by :**
- (A) The chemical nature of the hormone
 - (B) The distance between the endocrine cell and its target cell(s)
 - (C) The presence of specific receptors on target cells
 - (D) Anatomical connections between the endocrine and target cells
- 72. Which one of the following statements about morula in humans is correct ?**
- (A) It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote
 - (B) It has more cytoplasm and more DNA than an uncleaved zygote
 - (C) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
 - (D) It has far less cytoplasm as well as less DNA than in an uncleaved zygote

73. Glands of Moll in the margins of human eye is a modified form of :

- (A) Sudoriferous gland
- (B) Sebaceous gland
- (C) Ceruminous gland
- (D) Scent gland

74. Common in whale, bat and rat is :

- (A) Presence of external ears
- (B) Absence of neck
- (C) Muscular diaphragm between thorax and abdomen
- (D) Extra abdominal testes to avoid higher temperature inside the body

75. Among the following which one is the best indication of water pollution due to the mixing of human faeces ?

- (A) *Paramecium*
- (B) *Bacillus*
- (C) *Trypanosoma*
- (D) *E. coli*

ROUGH WORK

ROUGH WORK

ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

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Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Hons. School/2 Year Course)-Chemistry

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

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1. Which one of the following inorganic constituents in present is chlorophyll ?
(A) Mg (B) Cr
(C) Fe (D) Zn
2. If equal volumes of 1M KMnO_4 or 1M $\text{K}_2\text{Cr}_2\text{O}_7$ solutions are allowed to oxidize Fe (II) to Fe (III) in acidic medium, Fe (II) getting oxidized will be :
(A) More with KMnO_4 (B) More with $\text{K}_2\text{Cr}_2\text{O}_7$
(C) Equal in both cases (D) Cannot be determined
3. Which one of the following hydrides will be more acidic ?
(A) H_2O (B) H_2S
(C) H_2Se (D) H_2Te
4. Which of the following molecules has a linear shape ?
(A) H_2O (B) SnCl_2
(C) XeF_2 (D) H_2Se
5. Equivalent mass of the oxidising agent in the following reaction
 $\text{SO}_2 + 2\text{H}_2\text{S} \rightarrow 3\text{S} + 2\text{H}_2\text{O}$, will be :
(A) 8 (B) 16
(C) 32 (D) 64
6. The unit cell with dimensions $a = b = c = 90^\circ$, $a = b \neq c$ is :
(A) Cubic (B) Triclinic
(C) Hexagonal (D) Tetragonal
7. The units of cell constant are :
(A) $\text{ohm}^{-1} \text{cm}^{-1}$ (B) cm
(C) $\text{ohm}^{-1} \text{cm}$ (D) cm^{-1}
8. The number of S-S bonds in sulphur trioxide trimer (S_3O_9) is :
(A) 0 (B) 1
(C) 2 (D) 3

9. In which of the following molecule/ion, all the bonds are not equal ?
- (A) SiF_4 (B) XeF_4
(C) BF_4^- (D) SF_4
10. Which one of the following has the lowest boiling point ?
- (A) H_2O (B) H_2S
(C) H_2Se (D) H_2Te
11. XeF_2 is iso-structural with which one of the following ?
- (A) ICl_2^- (B) SbCl_3
(C) BaCl_2 (D) TeF_2
12. Which one of the following has square planar geometry ?
- (A) $[\text{FeCl}_4]^-$ (B) $[\text{NiCl}_4]^{2-}$
(C) $[\text{PtCl}_4]^{2-}$ (D) $[\text{CoCl}_4]^{2-}$
13. Which one of the following has highest CO stretching frequency ?
- (A) $[\text{Mn}(\text{CO})_6]^{+1}$ (B) $[\text{Fe}(\text{CO})_4]^{2-}$
(C) $[\text{Cr}(\text{CO})_6]$ (D) $[\text{V}(\text{CO})_6]^{-1}$
14. Alkyl halides react with lithium dialkyl copper reagents, R_2CuLi to give :
- (A) Alkenes (B) Alkyl copper halides
(C) Alkanes (D) Alkenyl halides
15. Isopropyl chloride undergoes hydrolysis by :
- (A) S_{N}^1 mechanism (B) S_{N}^2 mechanism
(C) S_{N}^1 and S_{N}^2 mechanism (D) Neither S_{N}^1 nor S_{N}^2 mechanism

16. When phenol is treated with CHCl_3 and NaOH , the product formed is :
- (A) Benzaldehyde (B) 2-Hydroxy benzaldehyde
(C) Salicylic acid (D) Benzoic acid
17. Total number of isomers possible for a compound with molecular formula $\text{C}_4\text{H}_{10}\text{O}$ are :
- (A) 3 (B) 5
(C) 7 (D) 8
18. Ground state term for d^5 configurations is :
- (A) 4F (B) 3P
(C) 4G (D) 6S
19. Which of the following does not undergo aldol condensation ?
- (A) $\text{C}_6\text{H}_5\text{CHO}$ (B) CCl_3CHO
(C) $\text{C}_6\text{H}_5\text{CH}_2\text{CHO}$ (D) CH_3CHO
20. Ketones combine with Grignard reagent, RMgI and gives :
- (A) 1° alcohol (B) 2° alcohol
(C) 3° alcohol (D) No alcohol
21. Which one of the following will have highest boiling point ?
- (A) 0.1 M NaCl (B) 0.1 M BaCl_2
(C) 0.1 M FeCl_3 (D) 0.1 M of Urea
22. The specific conductance of 0.1 M NaCl is $1.06 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$. Its molar conductance in $\text{ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ is :
- (A) 1.06×10^2 (B) 1.06×10^3
(C) 1.06×10^4 (D) 1.06×10^{-2}

23. The time required for 100% completion of a zero order reaction is :
- (A) ak (B) $a/2k$
(C) a/k (D) $2k/a$
24. The zero point energy of an S.H.O. is equal to :
- (A) $h\nu$ (B) $(1/2) h\nu$
(C) $(3/2) h\nu$ (D) 0
25. Milk is an example of :
- (A) Gel (B) Sol
(C) Emulsion (D) Foam
26. Which one of the following metals is used for the recovery of copper from copper sulphate solution ?
- (A) Sodium (B) Iron
(C) Silver (D) Mercury
27. Which one of the following is obtained upon the reduction of $\text{Na}_2\text{S}_2\text{O}_3$ by molecular I_2 ?
- (A) Na_2S (B) Na_2SO_4
(C) NaHSO_3 (D) $\text{Na}_2\text{S}_4\text{O}_6$
28. The structure of IF_7 is :
- (A) Square pyramid (B) Trigonal bipyramid
(C) Octahedral (D) Pentagonal bipyramid
29. The hybridization of xenon atom in XeOF_2 corresponds to ?
- (A) sp^3d^3 (B) sp^3d^2
(C) sp^3d (D) sp^3

30. The symmetry of phosphoryl chloride, POCl_3 molecule is :
- (A) C_{2v} (B) C_{3v}
(C) C_{4v} (D) T_d
31. Which one of the following molecules contains a quadrupole bond ?
- (A) $\text{Mn}_2(\text{CO})_{10}$ (B) $[\text{Cr}_2\text{O}_7]^{2-}$
(C) $[\text{Re}_2\text{Cl}_8]^{2-}$ (D) $\text{Fe}_2(\text{CO})_9$
32. A molecule that contains one unpaired electron is :
- (A) O_2 (B) CO
(C) CN^- (D) NO
33. The colour of copper sulphide is :
- (A) Blue (B) Yellow
(C) Black (D) Red
34. The compound used in the air bags of the cars for the safety of the occupants is ?
- (A) NaCl (B) CaCO_3
(C) NaN_3 (D) $\text{Al}(\text{NO}_3)_3$
35. Which one of the following compound is Wilkinson catalyst ?
- (A) RhCl_3 (B) $\text{RhCl}[(\text{C}_6\text{H}_5)_3\text{P}]_3$
(C) TiCl_4 (D) $\text{Fe}_2(\text{CO})_9$
36. The crystal field stabilization energy for high spin d^4 octahedral complex is :
- (A) $-1.2 \Delta_o$ (B) $-0.6 \Delta_o$
(C) $-1.8 \Delta_o$ (D) $-1.6 \Delta_o + P$

37. The spin only magnetic moment in case of $[\text{NiCl}_4]^{2-}$ will be :
- (A) 1.82 B.M. (B) 5.46 B.M.
(C) 2.82 B.M. (D) 1.41 B.M.
38. Which one of the following is the strongest base ?
- (A) $\text{C}_6\text{H}_5\text{NH}_2$ (B) $p\text{-NO}_2\text{-C}_6\text{H}_4\text{NH}_2$
(C) $m\text{-NO}_2\text{-C}_6\text{H}_4\text{NH}_2$ (D) $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$
39. Arsenic containing drug used in the treatment of syphilis was discovered by the following Nobel Laureates :
- (A) Geoffrey Wilkinson (B) Zeigler-Natta
(C) Paul Ehrlich (D) Alexander Fleming
40. Neoprene is a polymer that is obtained from which one of the following compounds ?
- (A) *cis*-isoprene (B) butadiene
(C) chloroprene (D) *trans*-isoprene
41. In alkaline medium, alanine exists predominantly as :
- (A) Anion (B) Cation
(C) Zwitter ion (D) Covalent molecule
42. C_{60} , Fullerene molecule is composed of :
- (A) 20 Pentagons, 12 Hexagons (B) 12 Pentagons, 20 Hexagons
(C) 20 Pentagons, 20 Hexagons (D) 12 Pentagons, 12 Hexagons
43. The structure of boron nitride resembles to :
- (A) Borazine (B) Benzene
(C) Graphite (D) Inorganic Benzene

44. Calcium carbide has the structure similar to :
- (A) SiO_2 (B) CaF_2
(C) NaCl (D) ZnS
45. The extinction coefficient has the following units :
- (A) $\text{dm}^3\text{mol}^{-1}\text{cm}^{-1}$ (B) $\text{dm}^2\text{mol}^{-1}\text{cm}^{-1}$
(C) $\text{dm}^3\text{mol}^{-2}\text{cm}^{-1}$ (D) $\text{dm}^3\text{mol}^{-1}\text{cm}^{-2}$
46. The force constant for HBr molecule is $4.13 \times 10^2 \text{ N m}^{-1}$. What will be the frequency of radiation for the transition $n = 0$ to $n = 1$?
- (A) $1.64 \times 10^{-27} \text{ kg}$ (B) $16.4 \times 10^{-27} \text{ kg}$
(C) $1.64 \times 10^{-27} \text{ kg}^{-1}$ (D) $16.4 \times 10^{-27} \text{ kg}^{-2}$
47. The Gibbs phase rule is :
- (A) $F = P - C + 2$ (B) $F = C - P + 2$
(C) $P = F - C + 2$ (D) $P = F - C + 1$
48. Well known thermite reaction occurs between :
- (A) Al and O_2 (B) S and O_2
(C) Sn and O_2 (D) Si and O_2
49. Which one of the following coordination compounds when dissolved in water does not precipitate on addition of silver nitrate solution ?
- (A) $\text{CoCl}_3 \cdot 6 \text{ NH}_3$ (B) $\text{CoCl}_3 \cdot 5 \text{ NH}_3$
(C) $\text{CoCl}_3 \cdot 4 \text{ NH}_3$ (D) $\text{CoCl}_3 \cdot 3 \text{ NH}_3$
50. Allylic bromination is carried out using :
- (A) $\text{Br}_2/\text{Acetic acid}$ (B) Br_2/CCl_4
(C) NBS/CCl_4 (D) $\text{KBr}/\text{H}_2\text{SO}_4$

51. The internal standard used in PMR spectrometer is

- (A) D_2O (B) $TMSCl$
(C) $CDCl_3$ (D) TMS

52. Vitamin C is one of the followings :

- (A) Ascorbic Acid (B) Citric Acid
(C) Lactic Acid (D) Thiamine

53. Characteristic reactions of aromatic compounds are :

- (A) Nucleophilic addition (B) Electrophilic addition
(C) Electrophilic substitution (D) Nucleophilic substitution

54. Which of the following is not oxidized by O_3 ?

- (A) KI (B) $FeSO_4$
(C) $KMnO_4$ (D) K_2MnO_4

55. The ESR spectrum of naphthalene radical anion consists of lines :

- (A) 10 (B) 20
(C) 25 (D) 30

56. What will be the pH of a solution that is obtained by mixing 50 ml of 0.2 M HCl with 50 ml of 0.1 M NaOH ?

- (A) 0.05 (B) 1.00
(C) 1.50 (D) 1.30

57. Which of the following ions is coloured due to d-d transition ?

- (A) MnO_4^- (B) $Cr_2O_7^{2-}$
(C) Fe^{3+} (D) Zn^{2+}

58. The oxidation state of nitrogen in NH_4NO_3 is :
- (A) +3 (B) +5
(C) +3 and +5 (D) -3 and +5
59. Which one of the following molecules is planar ?
- (A) NH_3 (B) NF_3
(C) $\text{N}(\text{SiH}_3)_3$ (D) $\text{N}(\text{CH}_3)_3$
60. Work done when 1 mole of an ideal gas is compressed reversibly from 1.0 bar to 4.0 bar at constant temperature of 300 K.
- (A) 3.46 kJ (B) -8.20 kJ
(C) 18.02 kJ (D) -14.01 kJ
61. Which law of Thermodynamics introduces the concept of entropy ?
- (A) First law (B) Second law
(C) Third law (D) Zeroth law
62. Root mean square velocity of a gas molecule is proportional to :
- (A) $m^{1/2}$ (B) m^0
(C) $m^{-1/2}$ (D) m
63. The coordination number and geometry of cerium in $[\text{Ce}(\text{NO}_3)_6]^{2-}$ are :
- (A) 6 and octahedron (B) 6 and pentagonal bipyramidal
(C) 8 and cubic (D) 12 and icosahedron
64. The tallest peak in mass spectrum is known as :
- (A) Metastable ion peak (B) Molecular ion peak
(C) Isotopic signal (D) Base peak

65. Reduction of benzenediazonium chloride with Zn/HCl gives :

- (A) Aniline (B) Phenylhydrazine
(C) Azobenzene (D) Hydrazobenzene

66. Tincture iodine is :

- (A) Aqueous solution of I₂ (B) Solution of I₂ in aqueous KI
(C) Alcoholic solution of I₂ (D) Aqueous solution of KI

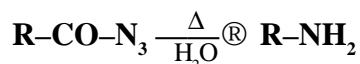
67. What is the pressure of oxygen gas in the room you are sitting in ?

- (A) 0.22 atm. (B) 0.78 atm.
(C) 1.0 atm. (D) 0.0 atm.

68. One of the following structures represents tetrahydrofuran :

- (A)  (B) 
(C)  (D) 

69. The following reaction is an example of



- (A) Hofmann rearrangement (B) Lossen rearrangement
(C) Curtius rearrangement (D) Cope rearrangement

70. Which of the following is the most stable carbocation ?

- (A) F₃C-CH₂⁺ (B) (CH₃)₂CH⁺
(C) CH₃⁺ (D) CF₃⁺

71. Indicator used in the titration of acidified KMnO₄ with ferrous sulphate is :

- (A) Phenolphthalein (B) Methyl orange
(C) Starch (D) None of A, B, C

- 72. During Bhopal tragedy, the gas released was :**
- (A) Potassium isothiocyanate (B) Phosgene
(C) Methyl isocyanate (D) Ammonia
- 73. Which of the following is a nido-borane ?**
- (A) B_4H_{10} (B) B_5H_9
(C) $[B_6H_6]^{2-}$ (D) B_5H_{11}
- 74. The average mass of chlorine is 35.5. The mass numbers of two isotopes are 35 and 37. What is the respective proportion of ^{35}Cl and ^{37}Cl in ordinary chlorine ?**
- (A) 1 : 2 (B) 2 : 1
(C) 1 : 3 (D) 3 : 1
- 75. The units of the van der Waals term, b in the gas equation are :**
- (A) $dm^3 mol$ (B) $dm^2 mol^{-1}$
(C) $dm^3 mol^{-1}$ (D) $dm^2 mol$

ROUGH WORK

ROUGH WORK

ROUGH WORK

CET(PG)-2016

Question Booklet Series : A

Sr. No. :

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Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Hons. School/2 Year Course)-Botany

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent / Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **The branch dealing with the study of algae is known as :**
(A) Cytology (B) Ecology
(C) Mycology (D) Phycology
2. **Agar-agar is obtained from :**
(A) Green algae (B) Red algae
(C) Brown algae (D) Blue green algae
3. **The variety of life in the world is known as :**
(A) Habitat (B) Diversity
(C) Biodiversity (D) Population
4. **Which of the following is a poisonous species of *Agaricus* :**
(A) *A. rodmani* (B) *A. silaticus*
(C) *A. brunnescens* (D) *A. campestris*
5. **A specialized structure called 'gemma cup' are present in :**
(A) *Funaria* (B) *Riccia*
(C) *Marchantia* (D) *Sphagnum*
6. **Which of the following is haploid in *Funaria* ?**
(A) Capsule (B) Protonema
(C) Sporophyte (D) Embryo
7. **A cluster of sporangia in ferns is called :**
(A) Ligule (B) Stele
(C) Sorus (D) Scales
8. **Pteridophytes are also known as :**
(A) Phanerogams (B) Spermatophytes
(C) Vascular cryptogams (D) Amphibians of plant kingdom
9. **Double fertilization is a unique feature of :**
(A) Angiosperms (B) Bryophytes
(C) Gymnosperms (D) Pteridophytes

- 10. Which part of the gynoecium receives the pollen grains ?**
(A) Ovule (B) Stigma
(C) Ovary (D) Style
- 11. Self fertilization that occurs in an unopened flower is known as :**
(A) Homogamy (B) Xenogamy
(C) Cleistogamy (D) Geitonogamy
- 12. The total number of fungal species thought to exist is :**
(A) 0.5 million (B) 0.75 million
(C) 1.0 million (D) 1.5 million
- 13. The term ecosystem was proposed by :**
(A) H. Bennett (B) J. Hansen
(C) A.G. Tansley (D) J.H. Lawton
- 14. The sugar found in DNA is :**
(A) Deoxyribose (B) Ribose
(C) Xylose (D) Ribulose
- 15. The related group of genera comprise :**
(A) A division (B) A family
(C) An order (D) A class
- 16. Who developed the binomial system of classification ?**
(A) Morgan (B) Smith
(C) Linnaeus (D) Anderson
- 17. From which part of the plant, the drug 'Aconite' is obtained ?**
(A) Stem (B) Roots
(C) Leaves (D) Bark
- 18. The position of a gene on a chromosome is called as :**
(A) Pleiotropy (B) Allele
(C) Genotype (D) Locus

19. **Diploid plants having chromosome number variations from $2n + 2$ to $2n - 2$ are :**
- (A) Aneuploids (B) Euploid
(C) Polyhaploid (D) Polyploids
20. ***Oryza sativa* is also known as :**
- (A) Coriander (B) Mango
(C) Barley (D) Paddy
21. **The botanical name of 'Clove' is :**
- (A) *Syzygium aromaticum* (B) *Syzygium cumini*
(C) *Syzygium paniculatum* (D) *Syzygium aqueum*
22. **Double trisomic is represented as :**
- (A) $2n + 3$ (B) $2n + 2$
(C) $2n - 2 + 2$ (D) $2n + 1 + 1$
23. **If $n = 2x$, the sporophyte of the organism would be :**
- (A) Diploid (B) Triploid
(C) Tetraploid (D) Pentaploid
24. **Which of the following is a purine ?**
- (A) Uracil (B) Adenine
(C) Cytosine (D) Thymine
25. **The exchange between segments of non-sister chromatids of homologous pair of chromosomes is called :**
- (A) Transduction (B) Transformation
(C) Crossing over (D) Conjugation
26. **A female is carrier for color blindness marries a normal male. What is the probability that their daughter will be colorblind ?**
- (A) 0% (B) 25%
(C) 50% (D) 75%
27. **In a mutation, adenine is replaced by cytosine. It is known as :**
- (A) Transversion (B) Transition
(C) Transcription (D) Translocation

28. DNA repair mechanism which splits the pyrimidine dimer is called as :
- (A) SOS repair (B) Excision repair
(C) Mismatch repair (D) Photoreactivation
29. *Anthoceros himalayensis* and *Anthoceros erectus* both are :
- (A) Annual (B) Perennial
(C) Perennial and annual respectively (D) Annual and perennial respectively
30. Which of the following is absent in transverse section of *Equisetum arvense* rhizome ?
- (A) Endodermis (B) Chlorenchyma
(C) Cuticle (D) Vallecular canal
31. Which species of the *Ectocarpus* is epizoic ?
- (A) *E. fasciculatus* (B) *E. conifer*
(C) *E. breviarticulatu* (D) *E. auratus*
32. Extra-chromosomal DNA is present in :
- (A) Ribosomes (B) Nucleus
(C) Golgi bodies (D) Chloroplast
33. The recombination frequency of 25% is equal to :
- (A) 25 map unit (B) 50 map unit
(C) 75 map unit (D) 100 map unit
34. Polygenic inheritance of kernel color in wheat was studied by :
- (A) Sutton and Boveri (B) Stanley
(C) Darwin (D) Nilsson-Ehle
35. Except and, the remaining 18 amino acids have more than one codon.
- (A) Cysteine and Tyrosine (B) Tryptophan and Methionine
(C) Serine and Proline (D) Alanine and Glutamine
36. Which of the following is not a fossil fuel ?
- (A) Wood (B) Petroleum
(C) Coal (D) Natural gas

37. *Ficus religiosa* is capable of doing photosynthesis even during night because of :
- (A) Carbon cycle rebalancing (B) C₄ photosynthesis
(C) C₃ photosynthesis (D) Crassulacean Acid Metabolism
38. Guard cells differ from subsidiary cells in having :
- (A) Mitochondria (B) Chloroplast
(C) Vacuoles (D) Nucleus
39. Which of the following is not a micronutrient ?
- (A) Zinc (B) Cobalt
(C) Copper (D) Magnesium
40. Heart rot of sugar beet is caused due to the deficiency of :
- (A) Manganese (B) Boron
(C) Iron (D) Molybdenum
41. Bacteria that fix nitrogen and established in root nodules is called :
- (A) *Euglena* (B) *Amoeba*
(C) *Paramecium* (D) *Rhizobium*
42. The G-protein is a :
- (A) Signal protein (B) Structural protein
(C) Defense protein (D) Transport protein
43. The Enzyme Commission (EC) has divided enzymes into :
- (A) 6 main groups (B) 12 main groups
(C) 18 main groups (D) 24 main groups
44. C-4 cycle was first reported in :
- (A) Spinach (B) Maize
(C) Sugarcane (D) Wheat
45. Which metal ion is constituent of chlorophyll ?
- (A) Mg (B) Fe
(C) K (D) Cu
46. The Tricarboxylic Acid (TCA) cycle occurs in —
- (A) Chloroplast (B) Mitochondria
(C) Golgi bodies (D) Endoplasmic reticulum

47. **Respiration Quotient (RQ) is the ratio of :**
- (A) CO_2/O_2 (B) O_2/N
(C) C/O_2 (D) N/C
48. is used to measure the growth.
- (A) Photometer (B) Auxanometer
(C) Spectrophotometer (D) Sphygmomanometer
49. **Which of the following is used in eradication of weeds ?**
- (A) IAA (B) 2, 4, 5-T
(C) 2, 4-D (D) NAA
50. **Multiple Cloning Sites (MCS) are also known as :**
- (A) Polymerase (B) Polyploids
(C) Polyembryony (D) Polylinker
51. **DNA in the nucleus is present in the form of :**
- (A) Lysosomes (B) Ribosomes
(C) Chromosomes (D) Chlorophyll
52. **Which of the following is not required for Polymerase Chain Reaction ?**
- (A) *Taq* polymerase (B) Radiolabelled DNA probe
(C) dNTPs (D) DNA template
53. **Haploids can be produced by culturing :**
- (A) Root (B) Bud
(C) Leaf (D) Anther
54. **A group of individuals that potentially interbreed in nature is called :**
- (A) Class (B) Family
(C) Genus (D) Species
55. ***Hibiscus rosa-sinensis* is a member of family :**
- (A) Orchidaceae (B) Rubiaceae
(C) Malvaceae (D) Euphorbiaceae

56. Seeds of were used by goldsmiths as weights :
- (A) *Abrus precatorius* (B) *Alhagi pseudalhagi*
(C) *Arachis hypogea* (D) *Astragalus heratensis*
57. Coralloid roots are found in :
- (A) *Sequoia* (B) *Lycopodium*
(C) *Taxus* (D) *Cycas*
58. Which order of the gymnosperms has only extinct forms ?
- (A) Gnetales (B) Cycadofilicales
(C) Cycadales (D) Ginkgoales
59. Which species of the genus *Gnetum* is used as fish poison ?
- (A) *G. latifolium* (B) *G. ula*
(C) *G. montanum* (D) *G. gnemon*
60. Chilgoza is a fruit obtained from :
- (A) *Ephedra* (B) *Pinus*
(C) *Abies* (D) *Zoniperus*
61. Which of the following has longest archegonial neck in gymnosperms ?
- (A) *Ginkgo* (B) *Welwitschia*
(C) *Ephedra* (D) *Cycadeoidea*
62. PBW 226, RAJ 3077, WG 377 and WL 410 are high yielding varieties of :
- (A) Jute (B) Maize
(C) Groundnut (D) Wheat
63. The function of 'Velamen' is :
- (A) Absorption (B) Respiration
(C) Protection (D) Reproduction
64. Haustorial roots are present in :
- (A) *Cuscuta* (B) *Ficus*
(C) *Tinospora* (D) *Delbergia*

65. Opposite decussate type of leaf arrangement is observed in :

- (A) *Ficus* (B) *Alstonia*
(C) *Calotropis* (D) *Typha*

66. Stipules are modified into tendril in :

- (A) *Smilax* (B) *Zizyphus*
(C) *Acacia* (D) *Gossypium*

67. The most common type of ovule in angiosperms is :

- (A) Anatropous (B) Orthotropous
(C) Campylotropous (D) Amphitropous

68. In which family, hairy structure known as pappus helps in dispersal of seeds ?

- (A) Moraceae (B) Asteraceae
(C) Ranunculaceae (D) Rutaceae

69. Bicollateral vascular bundles are present in family :

- (A) Compositae (B) Liliaceae
(C) Cucurbitaceae (D) Poaceae

70. Anemophily is the process of pollination by :

- (A) Insects (B) Birds
(C) Water (D) Wind

71. Helobial type of endosperm is found in :

- (A) *Acanthus* (B) *Saxifraga*
(C) *Impatiens* (D) *Capsella bursa-pastoris*

72. The fruit of Acacia is known as :

- (A) Carcerulus (B) Cremocarp
(C) Lomentum (D) Regma

73. *Withania somnifera* is commonly known as :

- (A) Ashwagandha (B) Arjun
(C) Amaltas (D) Gulmohar

74. Forest Research Institute (FRI) is located at :

- (A) Ambala (B) Baroda
(C) Chandigarh (D) Dehradun

75. Which character was improved in 'Golden rice' ?

- (A) Vitamin A (B) Vitamin C
(C) Herbicide resistance (D) Insect resistance

ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Hons. School)–Bio-Physics

Time : 90 minutes

Number of Questions : 74

Maximum Marks : 74

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
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- The area of the allowed regions in the Ramachandran map will be least for :**
(A) Gly (B) L-Ala
(C) L-Pro (D) α -methyl L-valine
- Small RNAs with internally complementary sequences that form hair-pin like structure, synthesized as precursor RNAs and cleaved by endonucleases to form short duplexes are called :**
(A) sn RNA (B) m RNA
(C) t RNA (D) mi RNA
- The free energy | G of a dissolved solute :**
(A) Increases with solute concentration (B) Decreases with solute concentration
(C) Is independent of solute concentration (D) Depends only on temperature
- Which of the cyclins have essential functions in S – phase of the cell cycle ?**
(A) A-Type (B) B-Type
(C) D-Type (D) Both B and D Type
- Na⁺ – K⁺ ATPase is a tetramer of 2a and 2b sub units. On which of the following subunits are Na⁺ and K⁺ binding sites present ?**
(A) Both on α (B) Both on β
(C) Na⁺ on α and K⁺ on β (D) Na⁺ on β and K⁺ on α
- The 5' cap of RNA is required for the :**
(A) Stability of RNA only (B) Stability and transport of RNA
(C) Transport of RNA only (D) Methylation of RNA only
- During generation of action potential, depolarization is due to :**
(A) K⁺ efflux (B) Na⁺ efflux
(C) Na⁺ influx (D) K⁺ influx
- G – protein linked receptors are transmembrane proteins of :**
(A) Single pass (B) Three pass
(C) Five pass (D) Seven pass
- Th 2 – response is generated and maintained by which of the following pair of cytokines ?**
(A) IL – 4 and IL – 10 (B) IL – 12 and IFN – γ
(C) IFN – γ and TNF – α (D) IL – 2 and IL – 12
- Which of the following molecules is involved in Ca²⁺ – dependent cell - cell adhesion :**
(A) Calmodulin (B) Cadherin
(C) N – CAM (D) Calpain

- 11. Which is the minimum number of NTPs required for the formation of one peptide bond during protein synthesis ?**
- (A) One (B) Two
(C) Four (D) Six
- 12. Transport of water across the aquaporins is regulated by the presence of which of the following sequences of the three conserved amino acids ?**
- (A) Ala – Asn – Pro (B) Pro – Asn – Ala
(C) Asn – Pro – Ala (D) Pro – Ala – Asn
- 13. During Urine formation, the filtration of blood at the glomerulus is :**
- (A) An active process (B) An osmotic process
(C) Pressure – dependent physical process (D) A non – energy mediated transport process
- 14. If the core body temperature of a human rises above normal, which of the following processes would be initiated sequentially for thermo regulation ?**
- (A) Peripheral vasodilation, increased rate of respiration, tachycardia
(B) Peripheral vasodilation, increased rate of respiration, bradycardia
(C) Peripheral vasodilation, decreased rate of respiration, tachycardia
(D) Peripheral vasodilation, decreased rate of respiration, bradycardia
- 15. Grave disease is associated with :**
- (A) Insufficiency of thyroid hormone (B) Excess of thyroid hormone
(C) Insufficiency of corticosteroids (D) Excess of growth hormone
- 16. A mother of blood group O has a group O child. The father could be of blood type :**
- (A) A or B or O (B) O only
(C) A or B (D) AB only
- 17. A mechanism that can cause a gene to move one linkage group to another is :**
- (A) Crossing over (B) Inversion
(C) Translocation (D) Duplication
- 18. ELISA assay uses :**
- (A) An enzyme which can react with the secondary antibody
(B) An enzyme which can react with the antigen
(C) A substrate which gets converted into a colored product
(D) A radiolabelled secondary antibody
- 19. Routinely used glucose biosensor estimates the blood glucose level by sensing the concentration of :**
- (A) Glucose (B) Oxygen
(C) S – gluconolactone (D) H₂ O₂

20. **Yeast Artificial Chromosome (YAC) vectors contain the selectable markers. Loss of which marker at the cloning site distinguishes the religated YACs from the original vector marker ?**
 (A) TRP 1 (B) SUP 4
 (C) URA 3 (D) CEN
21. **A protein in 100 mM KCl solution was heated and the observed T_m (midpoint of unfolding) was 60°C. When the same protein solution in 500 mM KCl was heated, the observed T_m was 65°C. What is the most probable reason for this increase in T_m ?**
 (A) Hydrogen bonding is increased
 (B) Hydrophobic interaction is decreased and electrostatic repulsion is increased
 (C) Hydrophobic interaction is increased and electrostatic repulsion is decreased
 (D) van der Waals interaction is increased
22. **An amino acid contains no ionizable group in its side chain (R). It is titrated from pH 0 to 14. Which of the following ionizable states is not observed during the entire titration in the pH range 0 – 14 ?**
- (A) $\text{H}_3\text{N}^+ - \overset{\text{R}}{\underset{|}{\text{CH}}} - \text{COO}^-$ (B) $\text{H}_3\text{N}^+ - \overset{\text{R}}{\underset{|}{\text{CH}}} - \text{COOH}$
 (C) $\text{H}_3\text{N} - \overset{\text{R}}{\underset{|}{\text{CH}}} - \text{COO}^-$ (D) $\text{H}_3\text{N} - \overset{\text{R}}{\underset{|}{\text{CH}}} - \text{COOH}$
23. **Fluorescence of a protein can be due to :**
 (A) Tryptophan (B) Tyrosine
 (C) Phenylalanine (D) All of these
24. **The proteins that run the fastest in the SDS – PAGE are :**
 (A) Large (B) Small
 (C) Negatively charged (D) Positively charged
25. **The electromagnetic radiation with longest wavelength is**
 (A) Visible light (B) Radiowaves
 (C) Microwaves (D) IR
26. **Mass spectrometry is an analytical technique for the identification of the molecules by way of measuring their :**
 (A) Mass only (B) Charge only
 (C) Mass to charge ratio (D) Charge to mass ratio
27. **Micro array analysis is used for :**
 (A) Quantization of gene expression (B) To check the quality of gene expression
 (C) For measuring the copy number (D) To identify the new genes
28. **The component of an atom involved in the study of structure with X – ray crystallography :**
 (A) Nucleus (B) Electron
 (C) Proton (D) Neutrons

- 29. The rays similar to the X – rays but of smaller wavelength that are given off by the radioactive substances are :**
- (A) Alpha rays (B) Beta rays
(C) Gamma rays (D) Cosmic rays
- 30. Antiparticle of electron is :**
- (A) Proton (B) Antiproton
(C) Positron (D) Neutron
- 31. Nucleic acid absorption (A_{260}) changes in different states. It is maximum when it is :**
- (A) Double standard (B) Single standard
(C) All the nucleotides are separated (D) Fragmented
- 32. Which one out of these is not a connective tissue ?**
- (A) Cartilage (B) Bone
(C) Muscle (D) Blood
- 33. Which of these is not a characteristic of the cardiac muscle ?**
- (A) Non-striated (B) Presence of intercalated disc
(C) Involuntary (D) Presence of actin and myosin filaments
- 34. Fertilization occurs in which region of the female reproductive tract ?**
- (A) Infundibulum (B) Ampulla
(C) Isthmus (D) Uterus
- 35. An aneuploid female with only one X – chromosome is a characteristic of an individual with :**
- (A) Cri du chat syndrome (B) Klinefelter syndrome
(C) Down syndrome (D) Turner syndrome
- 36. In which form of the DNA, the number of base pairs per helical turn is 10.5 ?**
- (A) A (B) B
(C) X (D) Z
- 37. On the molar scale, which of the following interactions in a non-polar environment provides highest contribution to the biomolecule ?**
- (A) van der Waals interaction (B) Hydrogen bonding
(C) Salt bridge (D) Hydrophobic interaction
- 38. Michaelis and Menten derived their equation in enzyme kinetics using which of the following assumptions ?**
- (A) Rate limiting step in the reaction is the breakdown of ES complex to product and the free enzyme
(B) Rate limiting step in the reaction is the formation of ES complex
(C) Concentration of the substrate can be ignored
(D) Non – enzymatic degradation of the substrate is the major step

- 39. The membrane lipid molecules assemble spontaneously into bilayers when placed in water and form a closed spherical structure known as :**
- (A) Lysosome (B) Peroxisome
(C) Liposome (D) Endosome
- 40. In gene regulation, open reading frame implies :**
- (A) Intervening nucleotide sequence in between two genes
(B) A series of triplet codons not interrupted by a stop codon
(C) A series of triplet codons that begins with a start codon and ends with stop codon
(D) The exonic sequence of a gene that corresponds to the 5' UTR of the mRNA and thus does not code for the protein
- 41. Graft rejection does not involve :**
- (A) Erythrocytes (B) T – cells
(C) Macrophages (D) Polymorphonuclear leukocytes
- 42. Toxic shock is caused by :**
- (A) Toxins produced by some bacteria
(B) Excessive stimulation of a large population of T – cells by bacterial superantigens
(C) Abnormal cytokine production by B – cells
(D) Excessive production of immunoglobulins
- 43. Indirect immunofluorescence involves fluorescently labelled :**
- (A) Immunoglobulin – specific antibodies (B) Antigen – specific antibodies
(C) Hapten – specific antibodies (D) Carrier – specific antibodies
- 44. The most important property of any microscope is its power of resolution, which is numerically equivalent to D , the minimum distance between two distinguishable objects. D depends on three parameters, namely, the angular aperture, a , the refractive index, N , and the wavelength, λ , of the incident light. Below are given few possible options to increase the resolution of the microscope.**
- P. Decrease the value of λ or increase either N or a to improve the resolution**
- Q. Moving the objective lens closer to the specimen will decrease $\sin a$ and improve the resolution**
- R. Using a medium with high refractive index between the specimen and the objective lens to improve the resolution**
- S. Increase the wavelength of the incident light to improve the resolution**
- Which of the following combination of the above statements is correct ?**
- (A) P and R (B) Q and R
(C) P and S (D) R and S
- 45. The radius of an atom is approximately :**
- (A) 10^{-10} m (B) 10^{-12} m
(C) 10^{-13} m (D) 10^{-16} m

- 46. Which one of the following interactions plays a major role in stabilizing B – DNA ?**
 (A) Hydrogen bond (B) Hydrophobic interaction
 (C) van der Waals interaction (D) Ionic interaction
- 47. Phosphatidyl serine, an important component of biological membrane, is located in :**
 (A) The outer leaflet but flip-flops to the inner leaflet under specific conditions
 (B) Both the leaflets
 (C) The middle of the bilayer
 (D) The inner leaflets but flip-flops to the outer leaflet under specific conditions
- 48. Major disadvantages of using liposome as a targeted drug delivery vehicle is that :**
 (A) It gets internalized by phagocytosis inside the lysosomes
 (B) It is very unstable and has low shelf-life
 (C) It gets intercalated in the cell membranes
 (D) Its drug entrapment efficiency is very low
- 49. ATP-Binding Cassettes (ABC) transporters :**
 (A) Are all P – glycoproteins
 (B) Are found only in the eukaryotes
 (C) Are both a membrane spanning domain that recognizes the substrate and an ATP - binding domain
 (D) Affect the translocation by forming channels
- 50. Site – specific recombination results in the precise DNA rearrangement, which is limited to specific sequences . The enzymes that are important to carry out the process are :**
 (A) Restriction endonuclease and DNA polymerase
 (B) Nuclease and Ligase
 (C) DNA polymerase and ligase
 (D) DNA polymerase and DNA gyrase
- 51. Which of the following statements is not true about the small interfering RNA (si RNA) ?**
 (A) si RNA has a 21-25 nucleotide sequence with 2 nucleotides overhanging at the 3' end
 (B) si RNA is processed by the RNA - protein complex called RISC
 (C) si RNA is often induced by the viruses
 (D) si RNA does not generally act at the level of transcription
- 52. Which of the following statements is incorrect in relation to treatment of pre-B cells with phorbol esters ?**
 (A) Phorbol esters activate protein kinase
 (B) Phorbol esters activate NF kB for translocation into the nucleus
 (C) Phorbol esters lead to the phosphorylation of NF kB
 (D) Phorbol esters remove the inhibitor from the inactive NF kB complex in the cytoplasm
- 53. Mycobacterium tuberculosis is an intra - cellular bacterium. It prefers to infect :**
 (A) Macrophages (B) B - cells
 (C) T- cells (D) Neutrophils

- 54. Integrin molecules link extracellular matrix (ECM) to the actin cytoskeleton of the cell. Integrin binds to which of the following ECM macromolecules ?**
- (A) Laminin (B) Collagen
(C) Fibronectin (D) Vibronectin
- 55. CD – 19 is a marker for :**
- (A) B – cells (B) T – cells
(C) Macrophages (D) NK – cells
- 56. Which one of the following matches of the oncogene – protein is not correct ?**
- (A) erb A – thyroid hormone receptor
(B) erb B – epidermal growth factor receptor
(C) ras – guanine nucleotide binding protein with GTP–ase activity
(D) fos – platelet derived growth factor receptor
- 57. The ced –9 gene appears to be a binary switch that regulates the cellular survival and apoptosis in nematodes. Considering that CED – 9 protein can bind to and inactivate CED – 4, which of the following would lead to apoptosis ?**
- (A) Activation of ced – 9 gene (B) Loss of function of CED – 3
(C) Loss of function of ced – 9 gene (D) Loss of function of CED – 4
- 58. Photosystems II function as a light – dependent water – plastoquinone oxidoreductase. What are the names of two reaction centre proteins that bind the electron transfer prosthetic groups, such as P680, pheophytin and plastoquinone ?**
- (A) CP 43 and CP 47 (B) D1 and D2
(C) 33 kDa and 23 kDa (D) F_A and F_B
- 59. Plants have evolved with multiple photoreceptors, which can perceive specific wavelength of light. Which of the following statements is correct about the photoreceptor ?**
- (A) Phytochrome A can perceive red and blue light
(B) Phytochrome C can perceive far red light
(C) Cryptochrome 1 and phytochrome B are responsible for perceiving blue light
(D) Phytochrome B can predominately perceive the far red light
- 60. To replace animal use in testing hepatic toxicity of a drug on trial, which one of the following would be used in vitro to be the closest to the in vivo scenario ?**
- (A) Liver cells
(B) Hepatic cell lines
(C) Liver slices
(D) Co-culture of liver parenchymal cells and the Kupffer cells

61. Which is the best method for the checking of mycoplasma contamination in a mammalian cell line ?
- (A) Southern hybridization (B) ELISA
(C) PCR (D) Western hybridization
62. If r denotes the correlation coefficient and m denotes the slope of the regression line, interchanging the X and Y axis would in fact :
- (A) Change m but not r (B) Change r but not m
(C) Change both r and m (D) Not change r or m
63. The use of biotinylated secondary antibody in EISA :
- (A) Increases the sensitivity of the assay but compromises the specificity
(B) Increases the sensitivity of the assay without compromising the specificity
(C) Does not alter either sensitivity or specificity
(D) Decreases both sensitivity and specificity
64. The intestinal absorption of glucose is impaired by the use of Ouabain, an inhibitor of Na^+/K^+ -ATPase. Indicate the correct explanation :
- (A) The inhibitor has blocked the transport of Na^+ from intestinal lumen to the epithelial cells
(B) The inhibitor has blocked the transport of Na^+ from the epithelial cells to the intestinal lumen
(C) The inhibitor has blocked Na^+ transport from the epithelial cells to the interstitial space
(D) The inhibitor has blocked the Na^+ transport from the interstitial space to the epithelial cells
65. A reporter cell line with stably integrated retroviral-promoter-luciferase construct was transfected with an expression vector for a cellular protein. The protein seems to regulate the activation of the retroviral promoter as analyzed by luciferase activity assay. Which one of the following techniques will you use to show the in vivo recruitment of the cellular protein on the integrated retroviral promoter ?
- (A) Electrophoretic Mobility Shift Assay (EMSA)
(B) RNase protection assay
(C) DNase hypersensitivity assay
(D) Chromatin immunoprecipitation assay
66. Out of the following hydrogen bonding schemes shown by ..., which one corresponds to the weakest hydrogen bonding in a given solvent condition ?
- (A) $\text{O} - \text{H} \dots \text{O} <$ (B) $\text{N} - \text{H} \dots \text{O} <$
(C) $\text{O} - \text{H} \dots \text{N} <$ (D) $\text{N} - \text{H} \dots \text{N} <$
67. Which peptide bond(s) will be broken which are marked as a, b, c, d and e when the following oligopeptide is treated with trypsin at pH 7.0 ?
- Lys a Arg b Pro c Lys d Arg e Gly
- (A) a, b, d, e (B) b, b, d, e
(C) d, e (D) d

- 68. In cellular respiration which of the following processes occur only inside the mitochondria and not in the cytoplasm ?**
- (A) Glycolysis and the pentose – phosphate pathway
 (B) Glycolysis and the citric acid cycle
 (C) The citric acid cycle and oxidative phosphorylation
 (D) Glycolysis and the oxidative phosphorylation
- 69. An enzyme catalyzed reaction was measured in the presence and absence of an inhibitor. For an uncompetitive inhibition :**
- (A) Only K_m is increased
 (B) Both K_m and V_{max} are decreased
 (C) Only V_{max} is decreased
 (D) Both K_m and V_{max} are not affected
- 70. KCl (100 mM) was entrapped inside large unilamellar vesicles. A diffusion potential across the bilayer can be generated by diluting with the buffer containing :**
- (A) 100 mM KCl and a protonophore
 (B) 100 mM NaCl and a protonophore
 (C) 100 mM KCl and a K^+ – specific ionophore
 (D) 100 mM NaCl and a K^+ – specific ionophore
- 71. Blood group type A antigen is a complex oligosaccharides which differs from H antigen present in type O individual by the presence of terminal :**
- (A) Glucose
 (B) Galactose
 (C) N – acetyl galactosamine
 (D) Fucose
- 72. During DNA replication, events at the replication fork require different types of enzymes having specialized functions except :**
- (A) DNA polymerase III
 (B) DNA gyrase
 (C) DNA ligase
 (D) DNA glycosylase
- 73. A protein has 30% alanine. If all the alanines are replaced by glycines then :**
- (A) The helical content will increase
 (B) β – sheet content will increase
 (C) There will be no change in conformation
 (D) The alanine – substituted protein will be less structured than the parent protein
- 74. The gel to liquid crystalline transition temperature (T_m) of the phospholipids is dependent on the fatty acid composition. Considering this the T_m of :**
- (A) All the phospholipids will be identical
 (B) DPPC will be lowest and DOPC will be highest
 (C) POPC and DOPC will be identical and lower than the DMPC or DPPC
 (D) DOPC will be lowest and DPPC will be highest

ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Industrial Chemistry)

Time : 90 minutes

Number of Questions : 74

Maximum Marks : 74

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

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1. Dimension of kinematic viscosity is :

- (A) MLT^{-1} (B) L^2T^{-1}
(C) L^2T (D) L^2T^{-2}

2. Bernoulli's equation describes :

- (A) Mechanical energy balance in potential flow
(B) Kinetic energy balance in laminar flow
(C) Mechanical energy balance in turbulent flow
(D) None of the above

3. A tube is specified by its :

- (A) Thickness only (B) Outer diameter only
(C) Thickness and outer diameter both (D) Inner diameter

4. When the pipe Reynold's number is 6000, the flow is generally :

- (A) Viscous (B) Laminar
(C) Turbulent (D) Transition

5. 20% oleum means that in 100 kg, there are 20 kg of :

- (A) SO_2 and 80 kg of H_2SO_4 (B) H_2SO_4 and 80 kg of SO_3
(C) SO_3 for each 100 kg of H_2SO_4 (D) NO SO_3 and SO_2 are formed

6. Gypsum is :

- (A) Calcium chloride (B) Potassium sulphate
(C) Sodium sulphate (D) Calcium sulphate

7. Wax is :

- (A) a mixture of glycerides
(B) a mixture of esters of polyhydric alcohols excepting glycerine
(C) liquid at room temperature
(D) a mixture of glycerides of fatty acids

8. Fat splitting catalyst is :

- (A) $CaCO_3$ (B) ZnO
(C) Al_2O_3 (D) Fe

9. Builders are added in soap to :

- (A) Boost cleaning power
- (B) Act as anti-redeposition agent
- (C) Act as corrosion inhibitor
- (D) Act as fabric brightener

10. Varnish does not contain :

- (A) Pigment
- (B) Thinner
- (C) Dryer
- (D) Anti-skinning agent

11. Molasses is the starting material for :

- (A) Alcohol
- (B) Essential oil
- (C) Fatty acids
- (D) Massecuite

12. Which is a high grade pulp :

- (A) Rag pulp
- (B) Mechanical pulp
- (C) Sulphate pulp
- (D) Sulphite pulp

13. Bleaching of paper pulp is done with :

- (A) Activated clay
- (B) Bromine
- (C) Chlorine or chlorine dioxide
- (D) Magnesium sulphite

14. Catalyst used in catalytic cracking is :

- (A) Silica-alumina
- (B) Silica gel
- (C) Vanadium pentoxide
- (D) Nickel

15. Butadiene is :

- (A) Di-olefin
- (B) Naphthene
- (C) Aromatic
- (D) Olefin

16. NPK means a :

- (A) Mixed fertilizer
- (B) Potassic fertilizer
- (C) Liquid fertilizer
- (D) Silica gel

- 17. Urea is formed only :**
- (A) in liquid phase (B) in vapour phase
(C) at very high temperature (D) at very low temperature (vacuum)
- 18. What is the unit of thermal conductivity ?**
- (A) kcal/hr.m²°C (B) kcal/hr.m. °C
(C) kcal/hr.m. (D) kcal/hr. °C
- 19. The emissivity of a black body is :**
- (A) 1 (B) 0
(C) 0.90 (D) 0.5
- 20. Evaporator tubes are generally :**
- (A) Horizontal (B) Vertical
(C) Inclined (D) Random
- 21. Thermal diffusivity is most important in heat transfer by :**
- (A) Conduction (B) Radiation
(C) Condensation (D) Natural convection
- 22. Fugacity and pressure are numerically equal when the gas is :**
- (A) in standard state (B) at high pressure
(C) at low temperature (D) in ideal state
- 23. The point at which both liquid and gas phases are identical, is called :**
- (A) Critical point (B) Triple point
(C) Freezing point (D) Boiling point
- 24. Which of the following is not a common refrigerant ?**
- (A) Freon-12 (B) Ethylene
(C) Ammonia (D) Carbon dioxide
- 25. Entropy change in case of reversible adiabatic process is :**
- (A) Minimum (B) Zero
(C) Maximum (D) Indeterminate

- 26. A coal containing high amount of volatile matter will have :**
- (A) Low ignition temperature (B) Very little ash content
(C) High fusion point of its ash (D) Low adiabatic flame temperature
- 27. Calorific value of coke oven gas is around :**
- (A) 900 kcal/Nm³ (B) 4200 kcal/Nm³
(C) 7500 kcal/Nm³ (D) 2000 kcal/Nm³
- 28. Percentage of carbon monoxide in blast furnace gas may be around :**
- (A) 0.5 (B) 7
(C) 23 (D) 53
- 29. High temperature carbonisation takes place at :**
- (A) 2000°C (B) 600°C
(C) 1100°C (D) 1600°C
- 30. The gasification reaction ($C + H_2O \rightleftharpoons CO + H_2$) is :**
- (A) Exothermic (B) Endothermic
(C) Catalytic (D) Auto catalytic
- 31. Gobar gas constitutes mainly of :**
- (A) CH₄ and CO₂ (B) CO and CO₂
(C) CH₄ and N₂ (D) CO and N₂
- 32. Which of the following is an alloy of nickel and copper ?**
- (A) Hastelloy (B) Duriron
(C) Monel (D) Inconel
- 33. Liquid ammonia is slugged in :**
- (A) Steel containers (B) Aluminium containers
(C) Glass containers (D) Lead lined vessels
- 34. Stainless steel is not corroded by :**
- (A) Hydrochloric acid (10%) (B) Nitric acid (10%)
(C) Sulphuric acid (10%) (D) Saturated brine

- 35. Concrete tank can be used to store :**
- (A) Alum (B) Ferrous sulphate
(C) Sulphuric acid (D) Saturated brine
- 36. Heat is generated in a nuclear reactor (thermal) by :**
- (A) Combustion of a nuclear fuel e.g Uranium (B) Fusion of atoms of Uranium
(C) Absorption of neutrons in Uranium atoms (D) Fission of U-235 by neutrons
- 37. Which of the following is a fuel for a fusion reactor (thermonuclear reactor) ?**
- (A) Deuterium and Tritium (B) U-233
(C) Thorium (D) Heavy water
- 38. Which one is radioactive in nature ?**
- (A) Helium (B) Deuterium
(C) Heavy hydrogen (D) Tritium
- 39. Which is not a basic refractory ?**
- (A) Chrome magnesite (B) Magnesite
(C) Dolomite (D) Silicon Carbide
- 40. X-rays are :**
- (A) Positively charged (B) Negatively charged
(C) Neutral (D) If higher wavelength than visible light
- 41. The pH of distilled water is :**
- (A) 0 (B) 1
(C) 7 (D) 14
- 42. Portland cement consists mainly of :**
- (A) CaO and SiO₂ (B) SiO₂ and Al₂O₃
(C) CaO and Al₂O₃ (D) CaO and Fe₂O₃
- 43. The major constituents in glass are :**
- (A) Lime, clay and soda ash (B) Sand, lime and soda ash
(C) Silica, alumina and clay (D) Silica, alumina and soda ash

- 44. Pig iron is :**
- (A) Made from cast iron
(B) Made from wrought iron
(C) One which comes out of blast furnace
(D) Free from impurities
- 45. Corrosion is :**
- (A) A physical phenomenon
(B) A chemical phenomenon
(C) Same as erosion
(D) An uncontrollable phenomenon
- 46. Methyl orange indicator turns :**
- (A) Orange yellow in alkaline medium
(B) Orange yellow in acidic medium
(C) Colourless in acidic medium
(D) Colourless in basic medium
- 47. Dryness fraction of dry steam is :**
- (A) 0
(B) ∞
(C) 1
(D) 2
- 48. Gear pump :**
- (A) is a positive displacement pump
(B) is a centrifugal pump
(C) is a non-positive displacement pump
(D) can be started with delivery pump closed
- 49. The schedule number of a pipe is an indication of its :**
- (A) Size
(B) Roughness
(C) Material density
(D) Wall thickness
- 50. Differential manometer measures :**
- (A) Absolute pressure
(B) Gauge pressure
(C) Pressure difference
(D) Pressure gradient
- 51. The fractional resistance in laminar flow does not depend on the :**
- (A) Area of surface in contact
(B) Flow velocity
(C) Fluid temperature
(D) Pressure of flow
- 52. Ball mill is used for :**
- (A) Crushing
(B) Coarse grinding
(C) Fine grinding
(D) Attrition

- 53. Rancidity of oil can be reduced by :**
- (A) Decoloration (B) Hydrogenation
(C) Oxidation (D) Purification
- 54. Trinitrotoluene (TNT), an explosive, is made by nitration of :**
- (A) Nitrobenzene (B) Toluene
(C) Nitrotoluene (D) Benzene
- 55. Cetane number of diesel used in trucks may be :**
- (A) 5 (B) 14
(C) 35 (D) 85
- 56. Molecular weight of crude petroleum may be around :**
- (A) 50 (B) 250
(C) 1500 (D) 5000
- 57. Which of the following hydrocarbons of same carbon atoms has minimum smoking tendency ?**
- (A) Paraffins (B) Naphthenes
(C) Aromatics (D) ISO-paraffins
- 58. The lowest flash point is of :**
- (A) Diesel (B) Kerosene
(C) Petrol (D) Furnace oil
- 59. Neoprene is a :**
- (A) Monomer (B) Synthetic rubber
(C) Polyester (D) PVC
- 60. Catalyst used during the manufacture of "Vanaspati Ghee" is :**
- (A) Zinc (B) Nickel
(C) Platinum (D) Copper
- 61. Alkyl benzene sulfonate (ABS) is a :**
- (A) Detergent (B) Rubber
(C) Pesticide (D) Polyester

- 62. Setting of Plaster Of Paris is accomplished with :**
- (A) Hydration (B) Dehydration
(C) Hydrolysis (D) Loss of CO₂
- 63. Which of the following is a naphthene ?**
- (A) Butene (B) Butadiene
(C) Cyclohexane (D) Acetylene
- 64. The main aim of cracking is to produce :**
- (A) Gasoline (B) Lube oil
(C) Petrolatum (D) Coke
- 65. Presence of sulphur in gasoline :**
- (A) Leads of corrosion (B) Increases lead susceptibility
(C) Decreases gum formation (D) Helps during stabilisation
- 66. Temperature and pressure in ammonia converter is :**
- (A) 1000°C, 200 atm (B) 200°C, 450 atm
(C) 550°C, 450 atm (D) 1000°C, 450 atm
- 67. Gas based fertilizer plants use :**
- (A) Natural gas as a source of hydrogen (B) Natural gas as heating medium
(C) Coal gas as a source of hydrogen (D) Coal gas as heating medium
- 68. With increase in temperature, the thermal conductivity of a gas :**
- (A) Increases
(B) Decreases
(C) Remains same
(D) May increase or decrease depending on the type of gas
- 69. The unit of conductance in SI unit is :**
- (A) W/m (B) W/m²
(C) W/°K (D) W/m°K
- 70. Raoult's law applies to :**
- (A) All liquid solutions (B) Only non-ideal solutions
(C) Non-volatile solute (D) The solvents

71. In binary system, separation is very efficient when relative volatility is :

- (A) 1 (B) >1
(C) <1 (D) 0.5

72. Steam distillation is used to separate :

- (A) Azeotropes
(B) High boiling substances from non-volatile impurities
(C) Heat sensitive materials
(D) Mixtures of low relative volatility

73. Milk is dried usually in a :

- (A) Freeze dryer (B) Spray dryer
(C) Tray dryer (D) Rotary dryer

74. Ion exchange process is similar to :

- (A) Absorption (B) Adsorption
(C) Extraction (D) Leaching

ROUGH WORK

CET(PG)-2016

Question Booklet Series : A

Sr. No. :

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Sc. (Microbial Biotech)

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent / Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **Which of the following vitamins does not act as a precursor for coenzymes ?**
(A) Biotin (B) Thiamine
(C) Folic acid (D) Ascorbic acid
2. **In the fluid mosaic model of the membrane :**
(A) The protein is arranged in layers
(B) The lipid has no specific arrangement
(C) The lipid is fluid and arranged in a bilayer with functional protein embedded in them
(D) Lipids are proteins and not arranged in any particular order
3. **In biological membrane, integral proteins and lipids interact mainly by :**
(A) Covalent bond (B) H-bond
(C) Hydrophobic interactions (D) Van der Waals force
4. **Taxol, an anti-cancerous drug effects by :**
(A) Inhibiting polymerization of tubulin (B) Inhibiting depolymerization of tubulin
(C) Polymerization of actin (D) Favoring depolymerization of tubulin
5. **One major branch of the immune response is mediated by T cells (cell mediated immunity), the other major branch is termed :**
(A) Blood-borne (B) Soluble
(C) Humoral (D) Antibiotic
6. **Heterocyst of cyanobacteria :**
(A) Are specialized for N₂ fixation
(B) Forms spores
(C) Are specialized for gamete formation
(D) Are specialized for oxygenic photosynthesis
7. **Statute of Anne got the royal assent in :**
(A) December, 1704 (B) October, 1705
(C) December, 1710 (D) April, 1710
8. **Which of the following enzymes do not occur in the lysosomes ?**
(A) Phosphatase (B) Lipase
(C) Protease (D) Polymerase

- 9. In the cell cycle, mitosis occurs between :**
- (A) G1 and S phase (B) S and G1 phase
(C) S and G2 phase (D) G1 and G2 phase
- 10. In aerobic yeast fermentation for production of citric acid from alkanes using a fed-batch culture, why alkanes are slowly fed to the yeast ?**
- (A) Citric acid is toxic to the cells
(B) Alkanes cause foaming
(C) Fast addition of alkanes will inhibit the cells and reduce oxygen transfer rates
(D) Fast addition of alkanes will cause the cells to grow quickly
- 11. Yield coefficient represents :**
- (A) Total biomass or product produced
(B) Conversion efficiency of a substrate into product
(C) Conversion rate of a substrate into biomass or product
(D) Production time of biomass or product
- 12. Which of the following does not contribute to the diversity of antibody structure ?**
- (A) Class switching (B) Allelic exclusion
(C) Combinatorial diversification (D) Junctional diversification
- 13. The del factor (D) increases as the final number of cells :**
- (A) Decreases (B) Increases
(C) Become constant (D) Become zero
- 14. Proteins required in the cytosol are synthesized on :**
- (A) Ribosomes on endoplasmic reticulum (B) SER
(C) Free ribosomes in the cytosol (D) Ribosomes on nuclear membrane
- 15. All the statements are true regarding RFLP and RAPD except :**
- (A) RAPD is quick method compared to RFLP
(B) RFLP is more reliable than RAPD
(C) Species specific primers are required for RAPD
(D) Radioactive probes are not required in RAPD

- 16. After interacting with a cell surface receptor that signals activation to a trimeric G-protein, the first event that happens is :**
- (A) GTP is hydrolyzed to produce GDP
 - (B) Tyrosines on the G-protein become phosphorylated
 - (C) The co-protein dissociates into a β -and $\alpha\gamma$ -subunits
 - (D) GTP replaces GDP in the α -subunit
- 17. What mechanism is responsible for movement of eukaryotic cilia and flagella ?**
- (A) Kinesin moving on microfilaments
 - (B) Dynein moving on microfilaments
 - (C) Dynein moving on microtubules
 - (D) Myosin moving on microtubules
- 18. The deviation from ideal plug flow due to axial mixing can be described by the :**
- (A) Dispersion model
 - (B) Langmuir model
 - (C) Friedlander model
 - (D) Pasceri model
- 19. Most of the protons, which play a crucial role in oxidative phosphorylation, enter the mitochondria as :**
- (A) Glucose
 - (B) Pyruvic acid
 - (C) Carbon dioxide
 - (D) Oxygen gas
- 20. During the first three steps of glycolysis, glucose is converted to fructose 1,6-diphosphate by rearrangement of the molecule and addition of two phosphate groups. The phosphate groups come from :**
- (A) Phospholipids of the membrane
 - (B) Inorganic phosphate
 - (C) ADP
 - (D) ATP
- 21. Treatment of root tip meristem with the microtubule inhibitor colchicine results in all of the following except :**
- (A) Induction of polyploidy
 - (B) Prevention of cytokinesis
 - (C) Inhibition of mitotic spindle assembly
 - (D) Cessation of DNA replication
- 22. Retinoblastoma is a tumor suppressor protein and is directly involved in :**
- (A) Cell cycle progression
 - (B) Transmission of extra-cellular signals to the nucleus
 - (C) Cytoskeleton rearrangement
 - (D) General inhibition of various oncoproteins

23. **R in TORCH group of diseases stands for :**
- (A) *Rhodococcus* (B) *Rubella*
(C) *Rickettsia* (D) *Rhizobium*
24. **South American sleeping sickness is transmitted by :**
- (A) Triatomid bug (B) Tsetse fly
(C) Rat flea (D) Gundy bug
25. **The Waterhouse-Friderichsen syndrome is most often associated with cases of :**
- (A) Cryptococcosis (B) Eastern equine encephalitis
(C) Kuru (D) Meningococcal meningitis
26. **The largest unit within which gene flow can readily occur is a :**
- (A) Population (B) Species
(C) Genus (D) Phylum
27. **Which of the following information would tell you whether a cell is prokaryotic or eukaryotic ?**
- (A) The presence or absence of a rigid cell wall
(B) Whether or not the cell is partitioned by internal membranes
(C) The presence or absence of ribosomes
(D) Whether or not the cell carries out cellular metabolism
28. **Slime molds in the division Myxomycota (true slim molds) have :**
- (A) Feeding stages consisting of solitary, individual cells
(B) Spores that develop into flagellated gametes
(C) Pseudoplasmodia
(D) Spores that develop into free-living amoeboid cells
29. **A bacterial culture contained 32×10^6 cells after 2.5 hours of exponential growth. If the doubling time was 30 min, what was the initial population number in this culture ?**
- (A) 20×10^4 cells (B) 40×10^5 cells
(C) 10×10^5 cells (D) 16×10^6 cells

- 30. Actin filaments are found in all of the following except the :**
- (A) Flagella of bacteria
 - (B) Sarcomeres of skeletal muscle cell
 - (C) Microvilli of the intestinal brush border
 - (D) Contractile rings of dividing animal cells
- 31. Potato spindle-tuber disease causes potatoes to become gnarled and cracked. This disease is caused by an infectious agent consisting of :**
- (A) Circular DNA molecules without a protein coat
 - (B) Circular RNA molecules with a protein coat
 - (C) DNA molecule with a protein coat
 - (D) Circular RNA molecule lacking a protein coat
- 32. Evidence indicating the chloroplasts were originally free-living prokaryotes that subsequently evolved a symbiotic relationship with a eukaryotic host includes all of the following except the :**
- (A) Similarities of rRNA sequences between chloroplasts and free living prokaryotes
 - (B) Similarities of structures between chloroplasts and some contemporary free-living prokaryotes
 - (C) Presence of circular DNA in chloroplasts and in free living prokaryotes
 - (D) Ability of chloroplasts to synthesize all their own proteins
- 33. A prophage is :**
- (A) An auxotrophic mutant
 - (B) A gene
 - (C) A phage DNA incorporated into the host genome
 - (D) The DNA of lytic phage
- 34. HIV replicates its genome using unique mechanisms. Which of the following statements about HIV is not correct ?**
- (A) HIV is an enveloped RNA virus
 - (B) The virion contains an RNA dependent RNA polymerase
 - (C) A DNA copy of the HIV genome integrates into host cell DNA
 - (D) The DNA of lytic phage
- 35. 5-methylcytosines are common sites for mutations because they :**
- (A) Can mispair with adenine
 - (B) Can deaminate to thymidine
 - (C) Prevent discrimination between the daughter and parental strand
 - (D) Can deaminate to uracil

- 36. Species having wide geographical ranges often develop locally adapted population called :**
- (A) Prototypes (B) Paratypes
(C) Syntypes (D) Ecotypes
- 37. Rate of storage of organic matter not used by heterotrophs is termed as :**
- (A) Net productivity (B) Net community productivity
(C) Gross primary productivity (D) Secondary productivity
- 38. Insulin has 51 amino acids arranged in :**
- (A) Single polypeptide
(B) Two polypeptides of 25 and 26 amino acids
(C) Three polypeptides having 15, 16 and 20 amino acids
(D) Two polypeptides of 21 and 30 amino acids
- 39. A transgenic food crop which may help in solving the problem of night blindness in developing countries :**
- (A) Golden rice (B) Bt soyabean
(C) Flavr savr tomatoes (D) Starlink maize
- 40. Restriction enzymes present in several microorganism cut foreign DNA at specific sites and destroy them. The enzymes do not destroy the cellular DNA because :**
- (A) The cellular DNA does not have the specific sites
(B) The susceptible specific sites are masked by proteins
(C) The restriction enzyme susceptible sites are modified by cellular enzymes
(D) The restriction enzymes and DNA occupy different compartments
- 41. The common mode of action of herbicides is :**
- (A) Blocking of xylem channels (B) Blocking of phloem channels
(C) Blocking of photosystem II (D) Blocking of photosystem I
- 42. Rapid callus proliferation in tissue culture is induced by :**
- (A) Ethylene (B) Gibberellins
(C) Auxin (D) Abscisic acid

- 43. The ANOVA test can be applied to compare :**
- (A) Three or more population means only
 - (B) More than four population means only
 - (C) More than three population means only
 - (D) More than five population means
- 44. Half life of any radioactive material is 50 days. How many half lifes it will take to become 12.5 % of the original amount ?**
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
- 45. Which of the following is molecular modeling database ?**
- (A) MMDB
 - (B) CATH
 - (C) FSSP
 - (D) SARF
- 46. What is the ionic strength of a 0.25 M CaCl_2 solution ?**
- (A) 1.0
 - (B) 1.5
 - (C) 2.0
 - (D) 2.5
- 47. During the exponential phase the maximum specific growth rate equals specific growth rate as :**
- (A) Concentration of the growth limiting substrate is much less than the monod constant
 - (B) Concentration of growth limiting substrate is much greater than the monod constant
 - (C) Specific growth rate increases exponentially
 - (D) Concentration of the growth limiting substrate is equal to the monod constant
- 48. Under GATT, the eighth round is referred to as the :**
- (A) Uruguay round
 - (B) Geneva round
 - (C) Torquay round
 - (D) Tokyo round
- 49. UNCED called the 'Earth Summit' held in Rio de Janeiro, Brazil in :**
- (A) December, 1992
 - (B) June, 1995
 - (C) June, 1992
 - (D) October, 1995

- 50. An organism that was growing at 37° C is shifted to 15° C. The organism is likely to change the membrane composition by :**
- (A) Increasing cholesterol and decreasing unsaturated fatty acids
 - (B) Decreasing both cholesterol and unsaturated fatty acids
 - (C) Increasing both cholesterol and unsaturated fatty acids
 - (D) Decreasing cholesterol and increasing unsaturated fatty acids
- 51. The carbon and nitrogen atoms in the pyrimidine ring system are derived from :**
- (A) Glycine and carbamyl phosphate
 - (B) Aspartate and glycine
 - (C) Glutamine and glycine
 - (D) Aspartate and carbamoyl phosphate
- 52. Which of the following is produced during water stress which brings about stomatal closure ?**
- (A) Abscisic acid
 - (B) Ethylene
 - (C) Ferulic acid
 - (D) Coumarin
- 53. When a short day plant (SD) and a long day plant (LD), both kept under favourable conditions for flowering, are exposed to a short flash of red light in the middle of the dark period :**
- (A) Both SD and LD plants will flower
 - (B) Both SD and LD plants will remain vegetative
 - (C) SD plant will remain vegetative and LD plant will flower
 - (D) SD plant will flower and LD plant will remain vegetative
- 54. ESTs are :**
- (A) Recombinant DNA
 - (B) cDNA
 - (C) mRNA
 - (D) rRNA
- 55. In the normal human being the concentration(s) of various antibodies in the serum are in the order :**
- (A) IgM > IgA > IgG > IgE
 - (B) IgG > IgA > IgM > IgE
 - (C) IgE > IgG > IgM > IgA
 - (D) IgA > IgM > IgE > IgG

- 56. What is the order of the following steps in Western blotting ?**
- P. protein denaturation**
Q. hydrogen peroxide reduction
R. primary antibody binding
S. transfer onto membrane
- (A) P, Q, R, S (B) Q, P, R, S
 (C) P, S, R, Q (D) None of the above
- 57. The relative level of specific IgM antibodies can be of diagnostic significance because :**
- (A) IgM is easier to detect than the other isotypes
 (B) Viral infection often results in very high IgM response
 (C) IgM antibodies are more often protective against reinfections than are the other isotypes
 (D) Relative high levels of IgM often correlate with a first recent exposure to the inducing agent
- 58. UV-spectroscopy is not used to quantitate which of the following compounds based on absorbance ?**
- (A) Nucleic acids have absorbance peak at 260 nm
 (B) NAD(P)H have absorbance peak at 340 nm
 (C) Aromatic amino acids have absorption maxima at about 280 nm
 (D) Sulfur containing amino acids have absorbance at 270 nm
- 59. A microorganism when viewed under a compound microscope with objective of 40 X and an eye piece of 10X magnification measured 400 μ in length. The same microorganism when viewed under a dissecting microscope with 10X, lens, would measure :**
- (A) 100 μ (B) 10 μ
 (C) 40 μ (D) 400 μ
- 60. The term bioinformatics was coined by :**
- (A) Paulies (B) Hesper
 (C) Paulien Hogeweg and Ben Hesper (D) Pauling
- 61. Which of the following bioreporters are typically used for the detection of chemical toxins ?**
- (A) Lux AB (B) Lux ABCDE
 (C) Lux CDABE (D) Non specific lux bioreporter

- 62. Which of the following show the correct order of the secretory pathway ?**
- (A) RER → golgi → secretory vesicle → cell exterior
 - (B) SER → golgi → secretory vesicle → cell exterior
 - (C) golgi → SER → secretory vesicle → cell exterior
 - (D) golgi → lysosome → SER → secretory vesicle → cell exterior
- 63. Desmosomes differ from tight junction because desmosomes :**
- (A) Allow molecules to pass in the intercellular space
 - (B) Are non-communicating
 - (C) Are present in plants
 - (D) Lack proteins
- 64. RNA interference works by which of the following methods ?**
- (A) Using antisense RNA molecule to block the translation of mRNA molecules
 - (B) Using RNA polymerase inhibitors to block the transcription of specific genes
 - (C) Using short, double-stranded RNA molecules that will cause the degradation of a mRNA molecule
 - (D) Using modified tRNA molecules to block the translation of mRNA molecules
- 65. In Scanning Electron Microscope, to form an image of the specimen :**
- (A) Electrons should pass through the specimen
 - (B) Electrons are scattered from the surface of the specimen
 - (C) A thin film of heavy metal is evaporated
 - (D) Specimens are stained
- 66. Which of the following amino acids is considered both ketogenic and glucogenic ?**
- (A) Aspartate
 - (B) Alanine
 - (C) Proline
 - (D) Tyrosine
- 67. Hardy-Weinberg genetic equilibrium holds good for :**
- (A) Panmictic population
 - (B) Mendelian population
 - (C) Assortative mating population
 - (D) Dissortative mating population
- 68. To increase the stringency of a wash buffer so as allow the detection of only completely matched hybrids you would :**
- (A) Lower the temperature and raise the salt concentration
 - (B) Lower the temperature and lower the salt concentration
 - (C) Raise the temperature and raise the salt concentration
 - (D) Raise the temperature and lower the salt concentration

- 69. Which of the following is not a substrate of ribulose 1, 5-bisphosphate carboxylase ?**
- (A) CO_2 (B) Glyceraldehyde 3-phosphate
(C) Ribulose 1, 5-bisphosphate (D) O_2
- 70. How many ATP molecules can be derived from each molecule of acetyl CoA that enters the Krebs's cycle (consider one NADH and FADH_2 give three and two ATP, respectively) ?**
- (A) 6 (B) 12
(C) 18 (D) 38
- 71. Electron acceptor in anaerobic conditions in prokaryotes is :**
- (A) Glucose, fructose, maltose (B) SO_4^{2-} , NO_3^- , CO_2
(C) Fatty acids (D) Antioxidants such as vitamin K
- 72. Residence Time Distribution (RTD) of a reactor is independent of :**
- (A) Micro mixing (B) Volume of reactor
(C) Height of reactor (D) Width of reactor
- 73. When is World Intellectual Property Day celebrated ?**
- (A) 26th April (B) 26th May
(C) 26th December (D) 26th March
- 74. An autoimmune disease of human usually involving anti-nuclear antibodies :**
- (A) Sclerosis (B) SLE
(C) Rheumatic fever (D) Myasthenia gravis
- 75. A fundamental difference between the antigen receptors on B cells (BCR) and on T cells (TCR) is their :**
- (A) Different requirements for antigen presentation
(B) Function following antigen binding
(C) Heterogeneity from one lymphocyte to the next
(D) Heterogeneity on each lymphocyte

ROUGH WORK

ROUGH WORK

CET(PG)-2016

Sr. No. :

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Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

**Subject : M.Sc. (Hons. School/2 Year Course)–Physics/Medical Physics/
Physics & Electronics**

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

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2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen.**
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**M.Sc. (Hons. School/2 Year Course)–Physics/Medical
Physics/Physics & Electronics/A**

1. A wave is described by $y(x, t) = 0.1 \sin(3x + 10t)$. The speed of wave is :
(A) $2\pi k/\omega$ (B) ω/k
(C) ωk (D) $2\pi/k$

2. The flux of the electric field $(24\hat{i} + 30\hat{j} + 16\hat{k})$ N/C through a 2.0 m^2 portion of the yz plane is :
(A) $32 \text{ N-m}^2/\text{C}$ (B) $34 \text{ N-m}^2/\text{C}$
(C) $42 \text{ N-m}^2/\text{C}$ (D) $48 \text{ N-m}^2/\text{C}$

3. In a cyclotron the dee is used :
(A) for the magnetic field shielding
(B) for the electric field shielding
(C) to improve the vacuum
(D) to make the path of charged particles circular

4. For a pure LC circuit the quality factor Q is :
(A) 0 (B) ∞
(C) e (D) $1/e$

5. The value of $\vec{\nabla} \cdot \vec{r}$ is :
(A) 1 (B) 2
(C) 3 (D) 4

6. The magnitude of the z-component of the orbital angular momentum of an electron in an atom is what multiple of \hbar ?
(A) 1 (B) 2
(C) $\sqrt{\ell(\ell \pm 1)}$ (D) m_ℓ

7. If the magnitude of the sum of two vectors is less than the magnitude of either vector, then :
(A) the scalar product of the vectors must be negative
(B) the scalar product of the vectors must be positive
(C) the vectors must be parallel and in opposite directions
(D) the vectors must be parallel and in the same direction

- 8. An example of an inertial reference frame is :**
- (A) any frame that is not accelerating
 - (B) a frame attached to a particle on which no force acts
 - (C) any frame that is at rest
 - (D) a frame attached to the center of the universe
- 9. A force acting on a particle is conservative if :**
- (A) its work equals the change in the kinetic energy of the particle
 - (B) it obeys Newton's second law
 - (C) it obeys Newton's third law
 - (D) its work depends on the end points of the motion, not the path between
- 10. In a nuclear reaction the total kinetic energy of the products is greater than the total initial kinetic energy if :**
- (A) one or more of the products is in an excited state
 - (B) the total mass of the products is less than the original total mass
 - (C) the total mass of the products is greater than the original total mass
 - (D) the collision is elastic
- 11. The speed of a comet in an elliptical orbit about the Sun :**
- (A) decreases while it is receding from the Sun
 - (B) constant
 - (C) is greatest when farthest from the Sun
 - (D) varies sinusoidally with time
- 12. The change in entropy is zero for :**
- (A) reversible adiabatic processes
 - (B) reversible isothermal processes
 - (C) reversible processes during which no work is done
 - (D) reversible isobaric processes
- 13. A sinusoidal force with a given amplitude is applied to an oscillator. To maintain the largest amplitude oscillation the frequency of the applied force should be :**
- (A) half the natural frequency of the oscillator
 - (B) the same as the natural frequency of the oscillator
 - (C) twice the natural frequency of the oscillator
 - (D) unrelated to the natural frequency of the oscillator

14. By the second law of thermodynamics :

- (A) all heat engines have the same efficiency
- (B) all reversible heat engines have the same efficiency
- (C) the efficiency of any heat engine is independent of its working substance
- (D) the efficiency of an ideal engine depends only on the temperatures of the two reservoirs

15. The equipotential surfaces associated with an isolated point charge are :

- (A) radially outward from the charge
- (B) vertical planes
- (C) horizontal planes
- (D) concentric spheres centered at the charge

16. If \vec{J} is the current density and $d\vec{A}$ is a vector element of area then the integral $\oint \vec{J} \cdot d\vec{A}$ over an area represents :

- (A) the electric flux through the area
- (B) the average current density at the position of the area
- (C) the resistance of the area
- (D) the current through the area

17. The magnetic field cannot :

- (A) exert a force on a charge
- (B) accelerate a charge
- (C) change the kinetic energy of a charge
- (D) change momentum of a charge

18. Helmholtz coils are commonly used in the laboratory because the magnetic field between them :

- (A) is specially strong
- (B) nearly cancels the earth's magnetic field
- (C) is nearly uniform
- (D) is parallel to the plane of the coils

19. An electric field is associated with :

- (A) every magnetic field
- (B) every time-dependent magnetic field
- (C) every time-dependent magnetic flux
- (D) every object moving in a magnetic field

20. The statement that magnetic field lines form closed loops is a direct consequence of :

- (A) Gauss's law for magnetism
- (B) Gauss's law for electricity
- (C) Faraday's law
- (D) Ampere's law

- 21. The magnetic properties of materials stem chiefly from :**
- (A) particles with north poles (B) particles with south poles
(C) electron magnetic dipole moments (D) proton magnetic dipole moments
- 22. Magnetization vectors in neighbouring ferromagnetic domains are :**
- (A) always in opposite directions
(B) always in the same directions
(C) always in the different directions
(D) sometimes in different directions and sometimes in the same direction
- 23. The behaviour of ferromagnetic domains in an applied magnetic field gives rise to :**
- (A) hysteresis (B) the Curie law
(C) a lowering of the Curie temperature (D) Gauss’s law for magnetism
- 24. Displacement current exists wherever :**
- (A) there is a magnetic field (B) there is a changing magnetic field
(C) there is an electric field (D) there is a changing electric field
- 25. Two of Maxwell’s contain a path integral on the left side and an area integral on the right. For them :**
- (A) the path must be well-separated from the area
(B) the path must be along a field line and the area must be perpendicular to the field line
(C) the path must be the boundary of the area
(D) the path must lie in the area, away from its boundary
- 26. In a plane electromagnetic wave in vacuum, the ratio E/B of the amplitudes in SI units of the two fields is :**
- (A) $\sqrt{2}$ (B) an increasing function of frequency
(C) a decreasing function of frequency (D) the speed of light
- 27. If the mass of a particle is zero, its speed must be :**
- (A) c (velocity of light) (B) zero
(C) infinite (D) any speed smaller than c

- 28. The proper time between two events is measured by clock at rest in a reference frame in which the two events :**
- (A) occur at the same time
 - (B) occur at the same coordinates
 - (C) are separated by the distance a light signal can travel during the time interval
 - (D) occur at the Greenwich time
- 29. In Compton scattering from stationary particles the maximum change in wavelength can be made smaller by using :**
- (A) higher frequency radiation
 - (B) lower frequency radiation
 - (C) more massive particles
 - (D) less massive particles
- 30. The probability that a particle is in a given small region of space is proportional to :**
- (A) the frequency of its wavefunction
 - (B) the wavelength of its wavefunction
 - (C) the square of the magnitude of its wavefunction
 - (D) its momentum
- 31. A free electron in motion along the x-axis has a localized wavefunction. The uncertainty in its momentum is decreased if :**
- (A) the wavefunction is made more narrow
 - (B) the wavefunction is made less narrow
 - (C) the wavefunction remains the same but the energy of the electron is increased
 - (D) the wavefunction remains the same but the energy of the electron is decreased
- 32. Photon in a LASER beam have the same energy, wavelength, polarization direction and phase because :**
- (A) each is produced in an emission that is stimulated by another
 - (B) all come from the same atom
 - (C) the lasing material has only two quantum states
 - (D) the photons are alike, no matter what their source

- 33. A metastable state is important for the generation of a LASER beam because it assures that :**
- (A) photons do not make upward transitions
 - (B) more photons are emitted than are absorbed
 - (C) photons do not collide with each other
 - (D) spontaneous emission does not occur more often than stimulated emission
- 34. The density of states for a metal depends primarily on :**
- (A) the temperature
 - (B) the energy associated with the state
 - (C) the size of the sample
 - (D) the type of the metal (e.g. gold, aluminium etc.)
- 35. The Fermi-Dirac occupancy probability $P(E)$ varies between :**
- (A) 0 and 1
 - (B) 1 and ∞
 - (C) 1 and ∞
 - (D) 0 and E_F (Fermi energy)
- 36. A given doped semiconductor can be identified as p or n type by :**
- (A) measuring its electrical conductivity
 - (B) measuring its coefficient of resistivity
 - (C) measuring its magnetic susceptibility
 - (D) performing a Hall effect experiment
- 37. In an unbiased p-n junction :**
- (A) the electrical potential vanishes everywhere
 - (B) the electrical field vanishes everywhere
 - (C) the drift current vanishes everywhere
 - (D) the drift and diffusion currents cancel each other
- 38. In the circuit of Hartley oscillator, the common emitter amplifier introduces the phase difference of :**
- (A) 90°
 - (B) 180°
 - (C) 0°
 - (D) 360°
- 39. A proton in a large nucleus :**
- (A) attracts all other protons
 - (B) repels all other protons
 - (C) attracts some protons and repels others
 - (D) attracts some neutrons and repels others

- 40. The binding energy of a nucleus is the energy that must be supplied to :**
- (A) remove a nucleon
 - (B) remove an alpha particle
 - (C) remove a beta particle
 - (D) separate the nucleus into its constituent nucleons
- 41. The half-life of a given nuclear disintegration $A \rightarrow B$:**
- (A) depends on the initial number of A atoms
 - (B) depends on the initial number of B atoms
 - (C) is an exponential increasing function of time
 - (D) None of the above
- 42. The energies of electrons emitted in beta decays have a continuous spectrum because :**
- (A) the daughter nucleus may have any energy
 - (B) more than one electron is emitted in each decay
 - (C) the neutrino can carry off any energy upto a certain maximum
 - (D) free electrons always have a continuous spectrum
- 43. Magnesium has atomic number 12. In the nuclear reaction $^{24}\text{Mg} + ^2\text{H} \rightarrow () + ^4\text{He}$, the missing quantity is :**
- (A) ^{22}Na ($Z = 11$)
 - (B) ^{21}Ne ($Z = 10$)
 - (C) ^{22}Ne ($Z = 10$)
 - (D) ^{21}Na ($Z = 11$)
- 44. A certain nucleus, after absorbing a neutron, emits a beta (electron) and then splits into two alpha particles. The (A, Z) of the original nucleus must have been :**
- (A) 7, 3
 - (B) 7, 2
 - (C) 6, 2
 - (D) 6, 3
- 45. The Becquerel is the correct unit to use in reporting the measurement of :**
- (A) the energy delivered by radiation to a target
 - (B) the rate of decay of radioactive source
 - (C) the biological effect of radiation
 - (D) the ability of a beam of gamma ray photons to produce ions in a target

- 46. Fission is possible because the binding energy per nucleon :**
- (A) decreases with mass number at high mass numbers
 - (B) increases with mass number at high mass numbers
 - (C) decreases with mass number at low mass numbers
 - (D) None of the above
- 47. The purpose of a moderator in a nuclear reactor is to :**
- (A) absorb dangerous gamma radiation
 - (B) provide neutrons for the fission processes
 - (C) slow down fast neutrons to increase the probability of fission
 - (D) react with the uranium to release energy
- 48. Which of the following particle is stable ?**
- (A) Proton
 - (B) Neutron
 - (C) Pion
 - (D) Muon
- 49. A particle with spin angular momentum \hbar is called a :**
- (A) fermion
 - (B) boson
 - (C) hadron
 - (D) lepton
- 50. The reflection coefficient R for a certain barrier tunneling problem is 0.77. The corresponding transmission coefficient T is :**
- (A) 1
 - (B) 0.20
 - (C) 0.23
 - (D) 0
- 51. An electron in a solid drops from the bottom of the conduction band at 5.5 eV to the top of the valence band at 3.2 eV. The emitted particle is :**
- (A) electron with 3.2 eV energy
 - (B) photon with 3.2 eV energy
 - (C) photon of 2.0×10^{15} Hz frequency
 - (D) hole of 2.3 eV energy
- 52. The principle of complementarity is due to :**
- (A) Einstein
 - (B) Maxwell
 - (C) Schrodinger
 - (D) Bohr

53. An electron is in a quantum state for which the magnitude of the orbital angular momentum is $2\sqrt{5} \hbar$. How many allowed values of the z-component of the angular momentum are there ?
- (A) 4 (B) 5
(C) 8 (D) 9
54. The wavefunction for an electron in a state with zero angular momentum :
- (A) zero everywhere (B) is spherically symmetric
(C) depends on the angle from the z-axis (D) depends on the angle from the x-axis
55. How many electrons can be accommodated in a state with orbital quantum number $l = 3$?
- (A) 7 (B) 14
(C) 3 (D) 9
56. The most energetic photon in a continuous X-ray spectrum has an energy approximately equal to :
- (A) the energy of all atoms in a target atom
(B) the kinetic energy of an incident electron beam
(C) the rest energy, mc^2 , of an electron
(D) the kinetic plus potential energy of a K-electron in the target atom
57. The characteristic K X-radiation of an element is caused by :
- (A) stoppage of electrons by the nucleus
(B) scattering of the incident radiation with a change of wavelength
(C) ejection of an electron from an outer shell
(D) transition of an electron to the innermost orbit
58. Which of the following electronic subshell in an atom can not exist ?
- (A) 2d (B) 3d
(C) 2p (D) 3p
59. An electron participates in :
- (A) the strong and weak forces only
(B) the electromagnetic and gravitational forces only
(C) the electromagnetic, gravitational and weak forces only
(D) the electromagnetic, gravitational and strong forces only

- 60. Two particles interact to produce only photons, with the original particles disappearing. The particles must have been :**
- (A) strange particles (B) strongly interacting
(C) a particle, antiparticle pair (D) leptons
- 61. Two basic interactions that have finite ranges are :**
- (A) weak and strong (B) gravitational and weak
(C) electromagnetic and strong (D) electromagnetic and weak
- 62. An electron with energy E is incident on a potential energy barrier of height E_{pot} and thickness L . The probability of tunneling increases if :**
- (A) E decreases without any other changes (B) E_{pot} increases without any other changes
(C) L decreases without any other changes (D) E and E_{pot} decrease by the same amount
- 63. The ac voltage measured by a moving coil voltmeter is 230 volt. Four diodes are used in series as an half-wave rectifier for this voltage. The break-down voltage of each diode should be :**
- (A) 58 volt (B) 82 volt
(C) 115 volt (D) 163 volt
- 64. Which of the following statement supports the non-existence of electron inside the nucleus ?**
- (A) the emission of gamma rays (B) the emission of positrons in beta decay
(C) the quadrupole moment of the nucleus (D) the magnetic moment of nucleus
- 65. A beam of protons, alphas, deuterons and carbon ions (charge 6+) with same kinetic energy strikes the surface of a medium. Maximum range in the medium will be for :**
- (A) protons (B) deuterons
(C) alphas (D) carbon ions
- 66. Which of the following rotational symmetry does not exist for the Bravais lattice ?**
- (A) 3-fold (B) 4-fold
(C) 5-fold (D) 6-fold

67. Which of the following statement is true :

- (A) X-ray diffraction pattern of a solid is a direct image of its space lattice
- (B) X-ray diffraction pattern of a solid is a direct image of its reciprocal lattice
- (C) X-ray diffraction pattern of a solid is a direct image of its energy band structure
- (D) X-ray diffraction pattern of a solid is a direct image of its magnetic structure

68. Which of the following observation gives the evidence of phonons ?

- (A) structure of reciprocal lattice
- (B) temperature dependence of lattice heat capacity
- (C) temperature dependence of electronic heat capacity
- (D) temperature dependence of paramagnetic susceptibility

69. As per Kronig-Penny model, the width of the allowed bands depends on :

- (A) concentration of electrons
- (B) phonon energy
- (C) binding energy of electrons
- (D) total number of electrons in the primitive cell

70. The superconducting state is an example of good :

- (A) diamagnet
- (B) paramagnet
- (C) ferromagnet
- (D) ferrimagnet

71. The Stern-Gerlach experiment makes use of :

- (A) a strong uniform magnetic field
- (B) a strong non-uniform magnetic field
- (C) a strong uniform electric field
- (D) None of the above

72. The negative feedback to an amplifier :

- (A) increases the frequency and phase distortion
- (B) increases stability
- (C) increases gain
- (D) reduces the bandwidth

- 73. The carrier wave is amplitude modulated with the 20 kHz audio signal. The bandwidth required for the amplitude modulation is :**
- (A) 10 kHz (B) 20 kHz
(C) 30 kHz (D) 40 kHz
- 74. The rotational molecular spectrum is observed for the molecules :**
- (A) H_2 , O_2 , Cl_2 (B) HCl, HBr, HI
(C) H_2 , HCl only (D) H_2 , HI only
- 75. Which of the following detector is not used for the energy determination of the nuclear radiations ?**
- (A) Scintillation counter (B) Proportional counter
(C) G.M. counter (D) Semiconductor detector

ROUGH WORK

CET(PG)-2016

Sr. No. :

Booklet Series Code : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate :

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1. Which of the following Maxwell's equation expresses Ampere's law ?
(A) $\nabla \cdot E = \rho/\epsilon_0$ (B) $\nabla \cdot B = 0$
(C) $\nabla \times E = -\frac{\partial B}{\partial t}$ (D) $\nabla \times B = \frac{J}{\epsilon_0 c^2} + \frac{1}{c^2} \frac{\partial E}{\partial t}$
2. The intensity of a sound wave is directly proportional to :
(A) the frequency (B) the amplitude
(C) the square of the amplitude (D) the square of the speed of sound
3. A well behaved wave function is :
(A) normalized and single valued (B) normalized and multi valued
(C) Single valued but not normalized (D) normalized with double valued derivatives
4. When the light is incident on a medium at the polarizing angle ?
(A) the reflected light is completely polarized with vibrations perpendicular to plane of incidence
(B) the reflected light is completely polarized with vibrations parallel to plane of incidence
(C) the transmitted light is completely polarized with vibrations perpendicular to plane of incidence
(D) the transmitted light is completely polarized with vibrations parallel to plane of incidence
5. The potential energy of a dipole (dipole moment p) placed in magnetic field B is minimum when ?
(A) p is perpendicular to B (B) p is parallel to B
(C) p is anti-parallel to B (D) p is inclined to B
6. The presence of impurities in a metal :
(A) increases the strength of the metal (B) increases the ductility of the metal
(C) makes a metal opaque (D) increases the elasticity of the metal
7. For an extrinsic semiconductor :
(A) the fermi level lies just above the valence band for p type, and just below the conduction band for n type
(B) the fermi level lies just above the valence band for n type, and just below the conduction band for p type
(C) the fermi level lies midway in the energy gap
(D) the fermi level lies within the conduction band
8. In a light dependent resistor (LDR), the resistance :
(A) increases linearly with increase in the intensity of light
(B) decreases linearly with increase in the intensity of light
(C) increases non-linearly with increase in the intensity of light
(D) decreases non-linearly with increase in the intensity of light
9. The high value of the elastic constant of a solid implies that :
(A) the solid has high elasticity (B) the solid is very stiff
(C) the solid has high yield strength (D) the solid has high ductility

- 10. The magnetic susceptibility of a ferromagnetic material is :**
- (A) large and negative (B) small and negative
(C) large and positive (D) small and positive
- 11. In the rotating crystal method for determination of crystal structure :**
- (A) the sample is taken in the powdered form and a polychromatic X-ray beam is used
(B) the sample is taken in the powdered form and a monochromatic X-ray beam is used
(C) the sample is a single crystal and a polychromatic X-ray beam is used
(D) the sample is a single crystal and a monochromatic X-ray beam is used
- 12. For a bounded particle, which of the following is true?**
- (A) the energy is a continuous function of frequency.
(B) the rest mass energy is zero
(C) the energy states are discrete
(D) the uncertainty principle is not valid
- 13. The directional nature of covalent bonds is responsible for :**
- (A) the high tensile strength of the covalently bonded solids
(B) low density of the covalently bonded solids
(C) ductility of the covalently bonded solids
(D) high refractive index of the covalently bonded solids
- 14. The Hall coefficient for a semiconductor, increases with :**
- (A) an increase in the applied current and applied magnetic field
(B) decrease in the applied current and applied magnetic field
(C) decrease in the charge carrier concentration
(D) increase in the width of the crystal
- 15. Hard magnetic materials are characterized by :**
- (A) high value of coercivity (B) low value of saturation magnetization
(C) low value of retentivity (D) low hysteresis loss
- 16. Which of the following waves diffract pronouncedly around the buildings ?**
- (A) Visible waves (B) UV
(C) Radio waves (D) X-Ray waves
- 17. Newton's rings are formed due to :**
- (A) Thin film interference (B) Double slit diffraction
(C) Polarisation by reflection (D) Total internal reflection
- 18. When a dielectric is subjected to sufficiently strong electric field ?**
- (A) dielectric breakdown takes place and dielectric becomes a conductor
(B) dielectric breakdown takes place and dielectric becomes an insulator
(C) dielectric breakdown takes place and dielectric behaves like a super-conductor
(D) dielectric breakdown takes place and infinite charge can be stored in it
- 19. Which of the spectral series of hydrogen atom lie in visible region?**
- (A) Lyman (B) Balmer
(C) Paschen (D) Brackett

20. The nuclear force is :

- (A) attractive in nature
- (B) repulsive in nature
- (C) may be attractive or repulsive depending on the total number of nucleons
- (D) may be attractive or repulsive depending on the ratio of protons and neutrons

21. Ferroelectric materials are characterized by :

- (A) Spontaneous polarisation below the Curie Temperature
- (B) Spontaneous polarisation above the Curie Temperature
- (C) Loss of polarisation below the Curie Temperature
- (D) A non reversible spontaneous polarisation

22. The crystal lattice of diamond is :

- (A) bcc with basis at 000 and $\frac{1}{2} \frac{1}{2} \frac{1}{2}$ positions
- (B) bcc with basis at 000 and $\frac{1}{4} \frac{1}{4} \frac{1}{4}$ positions
- (C) fcc with basis at 000 and $\frac{1}{2} \frac{1}{2} \frac{1}{2}$ positions
- (D) fcc with basis at 000 and $\frac{1}{4} \frac{1}{4} \frac{1}{4}$ positions

23. The dislocations in a metal are responsible for its :

- (A) high electrical conductivity
- (B) high thermal conductivity
- (C) lustre
- (D) ductility

24. The Ruby laser shows spiking :

- (A) due to chromium in the lasing medium
- (B) due to the nature of the pumping source
- (C) due to crystalline imperfections in ruby laser.
- (D) due to its four level laser system

25. Polarisation of light can not be achieved by :

- (A) Double refraction of light
- (B) Reflection of light
- (C) Transmission of light
- (D) Absorption of light

26. Let $A = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 2 & 3 \\ x & y & z \end{pmatrix}$ and let $V = \{(x,y,z) \hat{i} \hat{j} \hat{k}\}$; $\det(A) = 0$. Then the dimension of V equals :

- (A) 0
- (B) 1
- (C) 2
- (D) 3

27. Suppose $y_p(x) = x \cos(2x)$ is a particular solution of $y'' + ay = -4 \sin(2x)$. Then constant α equals :

- (A) -4
- (B) -2
- (C) 2
- (D) 4

28. Let $A = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$. then A^{50} is :

(A) $\begin{pmatrix} 1 & 0 & 0 \\ 50 & 1 & 0 \\ 50 & 0 & 1 \end{pmatrix}$

(B) $\begin{pmatrix} 1 & 0 & 0 \\ 48 & 1 & 0 \\ 48 & 0 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 1 & 0 & 0 \\ 25 & 1 & 0 \\ 25 & 0 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 0 & 0 \\ 24 & 1 & 0 \\ 24 & 0 & 1 \end{pmatrix}$

29. Let C be the boundary of the triangle framed by the points $(1,0,0)$, $(0,1,0)$ and $(0,0,1)$. Then the value of the line integral $\oint -2y \, dx + (3x - 4y^2) \, dy + (z^2 + 3y) \, dz$ is :

(A) 0

(B) 1

(C) 2

(D) 4

30. If $f(z) = \frac{1}{z^2 - 3z + 2}$, then the coefficient of $\frac{1}{z^3}$ in the Laurent expansion for $|z| > 2$ is :

(A) 0

(B) 1

(C) 3

(D) 5

31. The value of $\int_0^\infty \int_{1/4}^\infty x^4 e^{-x^6 y} \, dx \, dy$ equals :

(A) 4

(B) 3

(C) 2

(D) 1

32. Let $w = -\frac{1}{2} + ?\frac{\sqrt{3}}{2}$ then value of the determinant of $\begin{pmatrix} 1 & 1 & 1 \\ 1 & -1-w^2 & w^2 \\ 1 & w^2 & w^4 \end{pmatrix}$. (Here $? = \sqrt{-1}$)

(A) $3w$

(B) $3w(w - 1)$

(C) $3w^2$

(D) $3w(1 - w)$

33. An integrating factor for $(\cos y \sin 2x)dx + (\cos^2 y - \cos^2 x)dy = 0$ is :

(A) $\sec^2 y + \sec y \tan y$

(B) $\tan^2 y + \sec y \tan y$

(C) $\frac{1}{\sec^2 y + \sec y \tan y}$

(D) $\frac{1}{\tan^2 y + \sec y \tan y}$

34. Let E and F be any two events with $P(E \cap F) = 0.8 P(E) = 0.4$ and $P(E|F) = 0.3$ then $P(F)$ is :

- (A) $\frac{3}{7}$ (B) $\frac{4}{7}$
 (C) $\frac{3}{5}$ (D) $\frac{2}{5}$

35. The general solution of p.d.e. $\frac{\partial^2 z}{\partial x \partial y} = x + y$ is of the form :

- (A) $\frac{1}{2}xy(x + y) + F(x) + G(y)$ (B) $\frac{1}{2}xy(x - y) + F(x) + G(y)$
 (C) $\frac{1}{2}xy(x - y) + F(x)G(y)$ (D) $\frac{1}{2}xy(x + y) + F(x)G(y)$

36. Consider the system of linear equations :

$$\begin{aligned} x + y + z &= 3 \\ x - y - z &= 4 \\ x - 5y + kz &= 6 \end{aligned}$$

Then the value of k for which this system has an infinite number of solutions is :

- (A) $k = -5$ (B) $k = 0$
 (C) $k = 1$ (D) $k = 3$

37. Let f be a bilinear transformation that maps $-i$ to -1 , 1 to 0 and i to 1 . Then $f(1)$ is equal to (Here $i = \sqrt{-1}$) :

- (A) -2 (B) 0
 (C) i (D) $-i$

38. Which one of the following statements holds ?

- (A) The series $\sum_{n=0}^{\infty} x^n$ converges for each $x \in [-1, 1]$
 (B) The series $\sum_{n=0}^{\infty} x^n$ converges uniformly in $(-1, 1)$
 (C) The series $\sum_{n=0}^{\infty} \frac{x^n}{n}$ converges for each $x \in [-1, 1]$
 (D) The series $\sum_{n=0}^{\infty} \frac{x^n}{n^2}$ converges uniformly in $(-1, 1)$

39. Let $(x, y) \in \mathbb{R}^2$, let

$$f(x, y) = \begin{cases} \frac{2xy}{x^2 + y^2} & \text{if } (x, y) \neq (0, 0) \\ 0 & \text{if } (x, y) = 0 \end{cases}$$

Then :

- (A) f_x and f_y exist at $(0,0)$, and f is continuous at $(0,0)$
- (B) f_x and f_y exist at $(0,0)$, and f is discontinuous at $(0,0)$
- (C) f_x and f_y do not exist at $(0,0)$, and f is continuous at $(0,0)$
- (D) f_x and f_y do not exist at $(0,0)$, and f is discontinuous at $(0,0)$

40. Consider the initial value problem $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$. The aim to compute the value of

$y_1 = y(x_1)$, where $x_1 = x_0 + h$ ($h > 0$). At $x = x_1$, if the value of y_1 is equated to the corresponding value of the straight line passing through (x_0, y_0) and having the slope equal to the slope of the curve $y(x)$ at $x = x_0$, then the method is called :

- (A) Euler's method
- (B) Improved Euler's method
- (C) Backward Euler's method
- (D) Taylor series method of order 2

41. Two distinguishable fair coins are tossed simultaneously. Given that one of them lands up head, the probability of the other to land up tail is equal to :

- (A) $\frac{1}{3}$
- (B) $\frac{1}{2}$
- (C) $\frac{2}{3}$
- (D) $\frac{3}{4}$

42. Let $W = \{(x, y, z) \in \mathbb{R}^3 : 1 < x^2 + y^2 + z^2 < 4\}$ and $F : W \rightarrow \mathbb{R}$ be defined by $F(x, y, z) =$

$$\frac{(x, y, z)}{[x^2 + y^2 + z^2]^{3/2}} \text{ for } (x, y, z) \in W. \text{ If } S \text{ denotes the boundary of } W \text{ oriented by the outward}$$

normal n to W , then $\iint_S F \cdot n dS$ is equal to :

- (A) 0
- (B) 4π
- (C) 8π
- (D) 12π

43. If $D = \frac{d}{dx}$ then the value of $\frac{1}{(xD + 1)}(x^{-1})$ is :

- (A) $\log x$
- (B) $\frac{\log x}{x}$
- (C) $\frac{\log x}{x^2}$
- (D) $\frac{\log x}{x^3}$

44. Which of the following matrix is not diagonalizable ?

(A) $\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$

(B) $\begin{pmatrix} 1 & 0 \\ 3 & 2 \end{pmatrix}$

(C) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$

45. If $u(x, y)$ be the real part of an analytic function $f(z) = u(x, y) + iv(x, y)$ for $z = x + iy$. If

C is the positively oriented boundary of a rectangular region R in \mathbb{A}^2 , then $\oint_C \left[\frac{\partial u}{\partial y} dx - \frac{\partial u}{\partial x} dy \right] =$

(A) 1

(B) 0

(C) 2π

(D) π

46. If x, y and z are positive real numbers, then the minimum value of $x^2 + 8y^2 + 27z^2$

where $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$ is :

(A) 108

(B) 216

(C) 405

(D) 1048

47. For the matrix :

$$M = \begin{pmatrix} 2 & 3 + 2i & -4 \\ 3 - 2i & 5 & 6i \\ -4 & -6i & 3 \end{pmatrix},$$

which of the following statements are correct?

P: M is skew-Hermitian and iM is Hermitian

Q: M is Hermitian and iM is skew Hermitian

R: eigenvalues of M are real

S: eigenvalues of iM are real

(A) P and R only

(B) Q and R only

(C) P and S only

(D) Q and S only

48. The equation of the axis of right circular cylinder having guiding circle

$x^2 + y^2 + z^2 = 9, x - y + z = 3$ is :

(A) $x = y = z$

(B) $x = -y = z$

(C) $x = y = -z$

(D) $x = -y = -z$

49. If $u = \log \frac{x^5 + y^5 + z^5}{x^2 + y^2 + z^2}$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$ equals to :

(A) 3

(B) $3u$

(C) $5u$

(D) 5

- 50. If $f(x) = |x|$, then for interval $[-1, 1]$, which statement is correct ?**
- (A) $f(x)$ satisfies all the conditions of Rolle's Theorem
 (B) $f(x)$ satisfies all the conditions of Mean Value Theorem
 (C) $f(x)$ does not satisfy all the -conditions of Mean Value Theorem
 (D) None of these
- 51. Who is regarded as father of modern chemistry ?**
- (A) Rutherford (B) Einstein
 (C) Lavoisier (D) Thomson
- 52. Identify the wrong statement in the following :**
- (A) Atomic radius of the elements increases as one moves down the first group of the periodic table
 (B) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the
 (C) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius
 (D) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius
- 53. What among following is used to produce artificial rain ?**
- (A) copper oxide (B) carbon monoxide
 (C) silver iodide (D) silver nitrate
- 54. Oil of vitriol is :**
- (A) nitric acid (B) sulphuric acid
 (C) hydrochloric acid (D) phosphoric acid
- 55. Human bone does not contain :**
- (A) calcium (B) carbon
 (C) oxygen (D) phosphorous
- 56. Which one of the following is the softest ?**
- (A) sodium (B) iron
 (C) aluminium (D) lithium
- 57. Aspirin is :**
- (A) acetyl salicylic acid (B) sodium salicylate
 (C) methyl salicylate (D) ethyl salicylate
- 58. Properties that distinguish a substance from other but does not tell about its reaction ability will be a :**
- (A) energetic property (B) reacting property
 (C) chemical property (D) physical property
- 59. If no work is done by the gas, all the heat given to the system result in increase of :**
- (A) internal energy (B) pressure
 (C) temperature (D) density
- 60. Because gases adopt the shapes of the container, they have**
- (A) different shapes (B) fixed shapes
 (C) no fixed shapes (D) definite shapes
- 61. If an opaque object is placed in their path, cathode rays :**
- (A) are unaffected (B) are deflected
 (C) are absorbed (D) produce sharp shadows

- 62. When a force of one Newton acts over a distance of one metre, it is :**
 (A) one joule (B) one calorie
 (C) one watt (D) one pound
- 63. As long as temperature remains constant and concentration of water vapours do not change in a closed system it indicates :**
 (A) dynamic equilibrium (B) reversible process
 (C) reversible equilibrium (D) static equilibrium
- 64. The amount of solute present in a given amount of solvent or solution is called :**
 (A) concentration (B) molarity
 (C) molality (D) normality
- 65. The graph of pressure versus volume of a given mass of a gas at constant temperature is also called :**
 (A) isotone (B) isobar
 (C) isotherm (D) isotope
- 66. Greater the amount of a gas in the mixture, its partial pressure will be :**
 (A) normal (B) lesser
 (C) below normal (D) greater
- 67. With the rise in temperature, the vapour pressure of a liquid :**
 (A) decreases (B) remains constant
 (C) increases (D) do not change
- 68. On heating aldehydes with Fehling's solution, we get a precipitate whose color is :**
 (A) pink (B) black
 (C) yellow (D) brick red
- 69. Reaction of Acyl chlorides with alcohols and phenols will give :**
 (A) esters (B) ketones
 (C) aldehydes (D) haloalkanes
- 70. Triethylamine is an example of :**
 (A) primary amine (B) secondary amine
 (C) tertiary amine (D) quaternary amine
- 71. Number of bonding pairs of electrons in water H_2O is :**
 (A) 1 (B) 2
 (C) 3 (D) 4
- 72. Amylose is :**
 (A) soluble in water (B) insoluble in water
 (C) soluble in alcohol (D) partially soluble in alcohol
- 73. The most electronegative element among the following is :**
 (A) Sb (B) N
 (C) P (D) As
- 74. Haloalkanes react with water in silver nitrate solution to give off :**
 (A) alcohol (B) alkanes
 (C) ester (D) ketone
- 75. Crystallization does not involve :**
 (A) heating (B) sublimation
 (C) cooling (D) vaporization

ROUGH WORK

CET (PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Tech. (Nano Science and Nano Tech.)

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. Which of the following statements is/are true ?
 - (i) Volume to surface area ratio is very large for nanomaterials
 - (ii) The cut-off limit of human eye is 10^{-5} m
 - (iii) Hardness of a single wall carbon nanotube (SWNT) is about 63×10^9 P(A)
 - (iv) Carbon nanotubes are cylindrical graphene

(A) All four (B) (ii) and (iv)
(C) (i), (ii) and (iv) (D) (ii), (iii) and (iv)

2. The smallest cluster of carbon atoms in Bucky balls known till today consists of carbon atoms :

(A) 75 (B) 60
(C) 20 (D) 15

3. The surface area to volume ratio of a cube with side 1 unit is R_1 and that of a cube with side 10 units is R_2 . Then $R_2 = \underline{\hspace{2cm}} R_1$.

(A) 1/10 (B) 10
(C) 1/100 (D) 100

4. The full form of STM is... :

(A) Scanning Tunneling Microscope (B) Scientific Technical Microscope
(C) Systematic Technical Microscope (D) Super Tensile Microscope

5. Which are the POSSIBLE risks of nanotechnology today ?

(A) nanomachines might devour the world and turn everything into a “gray goo”
(B) nano-robots could take pictures of secret documents and relay them to foreign agents
(C) scattered nanoparticles may recombine in nature to form new elements and chemical compounds that are highly reactive and toxic
(D) Waste nanomaterials may end up in groundwater, rivers, and lakes where they kill off fish and other wildlife

6. Rutherford’s model of the atom fails to explain :

(A) the neutral nature of atom
(B) the presence of a positively charged nucleus
(C) the heavy mass of the nucleus
(D) the stability of the atom

7. **The relation between two current amplification factors of a transistor is :**
(A) $\beta = \alpha/(1+\alpha)$ (B) $\beta = (1-\alpha)/\alpha$
(C) $\beta = \alpha/(1-\alpha)$ (D) $\beta = (1+\alpha)/\alpha$
8. **Which of the following electronic configurations correspond to a noble gas :**
(A) 2, 8, 4 (B) 2, 8, 18
(C) 2, 8, 18, 7 (D) 2, 8, 3
9. **The area under hysteresis loop is proportional to :**
(A) Magnetic energy density (B) Electric energy per unit volume
(C) Thermal energy per unit volume (D) Mechanical energy per unit volume
10. **The energy is emitted in the form of :**
(A) Electrons (B) Neutrons
(C) Photons (D) Protons
11. **If we assume that there are no elements with principal quantum number >3, then the periodic table would consist of how many elements ?**
(A) 14 (B) 28
(C) 60 (D) 108
12. **Drift current is less than the diffusion current on the p-n junction. This means that :**
(A) p-n junction is forward biased (B) p-n junction is reverse biased
(C) p-n junction is unbiased (D) not biased at all
13. **Silica gel is used for keeping away the moisture because it :**
(A) Adsorbs water molecules (B) Absorbs molecules
(C) Reacts with water (D) Hydrophobic
14. **Which one of the following does not have a sp^2 hybridized carbon ?**
(A) Acetone (B) Acetic acid
(C) Acetonitrile (D) Acetamide

15. Burger's vector characterizes :

- (A) Dislocation line
- (B) Space
- (C) Fracture
- (D) Hardness

16. Gibb's phase rule states that :

- (A) $F = C + P + 2$
- (B) $F = C - P + 2$
- (C) $F = C - P - 2$
- (D) $F = C + P - 2$

17. Czochralski method is a :

- (A) Crystal growth technique
- (B) Welding technique
- (C) Forging technique
- (D) X-ray analysis method

18. Biotin is involved in which of the two types of reactions :

- (A) Hydroxylations
- (B) Carboxylations
- (C) Decarboxylations
- (D) Dehydrations

19. The major source of extracellular cholesterol is :

- (A) Very low density lipoprotein (VLDL)
- (B) Low density lipoprotein (LDL)
- (C) High density lipoprotein (HDL)
- (D) Albumin

20. $\vec{N} \times \vec{A} = \vec{0}$ then \vec{A} is :

- (A) Null
- (B) Infinity
- (C) Constant
- (D) Irrational

21. Nitrogen gas is reduced to ammonia through nitrogen fixation method. In order to execute the process, which one of the following compounds is usually required ?

- (A) ATP
- (B) GTP
- (C) UDP
- (D) ADP

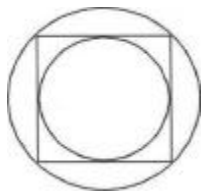
22. **The quantum yield of oxygen evolution during photosynthesis drastically drops in far red light. The effect is known as :**
- (A) Far red loop (B) Red drop
(C) Blue drop (D) Visible spectrum drop
23. **Cystic fibrosis transmembrane conductance regulator (CFTR) is known to control the transport of which ion ?**
- (A) Ca^{2+} (B) Mg^{2+}
(C) HCO_3^- (D) Cl^-
24. **Which one of the following events never activates the G-protein coupled receptor for sequestering Ca^{2+} release ?**
- (A) Interaction of binding to stem receptors
(B) Activation of Frizzled by Wnt
(C) Cortical reaction blocking polyspermy
(D) DNA synthesis and nuclear envelope breakdown
25. **The main difference between normal and transformed cells are :**
- (A) Immortality and contact inhibition
(B) Shorter generation time and cell mobility
(C) Apoptosis and tumour suppressor gene hyper-function
(D) Inactivation of oncogenes and shorter cell cycle duration
26. **Which one of the following combinations must be present in a steroid receptor that is located in a cytoplasm ?**
- (A) Nuclear export sequence (NES), leucine zipper
(B) NES-zinc finger motif
(C) Nuclear localization sequence (NLS)- zinc finger motif
(D) NLF, leucine zipper
27. **Which one of the following skeletal muscles of the human body contains higher number of muscle fibres in motor unit ?**
- (A) Muscles of hand (B) Extraocular muscles
(C) Muscles of leg (D) Muscles of face

- 28. Which one of the methods listed below is the most sensitive label free quantification method for proteins ?**
- (A) UV spectroscopy (B) Infra-red spectroscopy
(C) Raman spectroscopy (D) ^{13}C content of protein
- 29. Which one of the following viruses causes acute gastrointestinal illness due to contamination of the drinking water ?**
- (A) Norovirus (B) Poliovirus
(C) Rotavirus (D) Filovirus
- 30. An extraordinary sensory ability that elephants possess is :**
- (A) Emission and detection of ultra high frequency sounds
(B) Emission and detection of ultra low frequency sounds
(C) Detection in changes in the earth's magnetic field
(D) Possession of ultraviolet vision.
- 31. The heat capacity of (the interior of) a refrigerator is 4.2 kJ/K. The minimum work that must be done to lower the internal temperature from 18°C to 17°C when the outside temperature is 27°C is :**
- (A) 2.20 kJ (B) 0.80 kJ
(C) 0.30 kJ (D) 0.14 kJ
- 32. If the reverse bias voltage of a silicon varactor is increased by a factor of 2, the corresponding transition capacitance :**
- (A) Increases by a factor of $\sqrt{2}$ (B) Increases by a factor of 2
(C) Decreases by a factor of $\sqrt{2}$ (D) Decreases by a factor of 2
- 33. For a system of independent non-interacting one-dimensional oscillators, the value of the free energy per oscillator, in the limit, is :**
- (A) $\frac{1}{2} \hbar \omega$ (B) $\hbar \omega$
(C) $1.5 \hbar \omega$ (D) 0

34. The number of diagonals of a convex dodecagon (12-gon) is :

- (A) 66 (B) 54
(C) 55 (D) 60

35. There is an inner circle and an outer circle around a square. What is the ratio of the area of the outer circle to that of the inner circle ?



- (A) $\sqrt{2}$ (B) 2
(C) $2\sqrt{2}$ (D) $\sqrt{1.5}$

36. The molecule C_3O_2 has a linear structure. This compound has :

- (A) 4 σ and 4 π bonds (B) 3 σ and 2 π bonds
(C) 2 σ and 3 π bonds (D) 3 σ and 4 π bonds

37. Spin motion of which of the following gives magnetic moment

1. Electron; 2. Proton; 3. Neutron

- (A) 1 and 2 (B) 2 and 3
(C) 1 and 3 (D) 1, 2 and 3

38. The concentration of a $MgSO_4$ solution having the same ionic strength as that of a 0.1M Na_2S_4 solution is :

- (A) 0.05 M (B) 0.067 M
(C) 0.075 M (D) 0.133 M

39. If the reduced mass of a diatomic molecule is doubled without changing its force constant, the vibrational frequency of the molecule will be :

- (A) $\sqrt{2}$ times the original frequency (B) $1/\sqrt{2}$ times the original frequency
(C) Twice the original frequency (D) Unchanged

- 40. The calibration curve in spectrofluorimetric analysis becomes non-linear when :**
- (A) Molecular weight of analyte is high (B) Intensity of light source is high
(C) Concentration of analyte is high (D) Molar absorptivity of analyte is high
- 41. The average end-to-end distance of a random coil polymer of 10^6 monomers (in units of segment length) is :**
- (A) 10^6 (B) 10^5
(C) 10^4 (D) 10^3
- 42. Though a constant shift of energy levels of a system changes the partition function, the properties that do not change are :**
- (A) Average energy, entropy and heat capacity (B) Average energy and entropy
(C) Average energy and heat capacity (D) Entropy and heat capacity
- 43. As temperature increases, diffusivity of an impurity atom in a solid material :**
- (A) increases (B) decreases
(C) remains constant (D) depends on the specific material
- 44. Which of the following is NOT correct ?**
- (A) Dislocations are thermodynamically unstable defects
(B) Dislocations can move inside a crystal under the action of an applied stress
(C) Screw dislocations can change the slip plane without climb
(D) Burger's vector of an edge dislocation is parallel to the dislocation line
- 45. Which one of the following metals is commonly alloyed with iron to improve its corrosion resistance ?**
- (A) Co (B) Cr
(C) Ti (D) Nb
- 46. The number of slip systems in a metal with FCC crystal structures :**
- (A) 4 (B) 6
(C) 8 (D) 12

- 47. Upon recrystallization of a cold worked metal :**
- (A) strength increases and ductility decreases (B) strength decreases but ductility increases
(C) both strength and ductility increase (D) both strength and ductility decrease
- 48. In carbon fiber reinforced resin composites, for a given fiber volume content, Young's modulus depends on the orientation of the fiber with respect to the applied load. Which orientation of the fibers will give the maximum value of Young's modulus ?**
- (A) transverse (B) longitudinal
(C) random (D) both transverse and longitudinal
- 49. Vulcanization is related to :**
- (A) strengthening of rubber (B) extrusion
(C) injection moulding (D) addition polymerisation
- 50. The fuel air mixture in a petrol engine is ignited with a spark plug at the end of compression stroke. This process**
- (A) increases the entropy of the fuel air mixture but decreases the entropy of the spark plug
(B) decreases the entropy of the fuel air mixture but increases the entropy of the spark plug
(C) decreases the entropy of the fuel air mixture and of the spark plug
(D) increases the entropy of the fuel air mixture and of the spark plug
- 51. For an ideal gas as a working fluid for a given heat input Q , the process that gives the maximum work among the following four processes is :**
- (A) isothermal (B) constant volume
(C) constant pressure (D) isentropic
- 52. High molecular weight polymers could be obtained even at low monomer conversion in case of :**
- (A) Step growth polymerization (B) Living polymerization
(C) Chain growth polymerization (D) Solid state polymerization

- 53. A reinforced polymer composite is made by the incorporation of :**
- (A) elastomers into the polymer (B) fibers into the polymer
(C) plasticizers into the polymer (D) gaseous additives into the polymer
- 54. The primary bacterial spoilage of poultry meat at low temperature, with characteristic sliminess at outer surface, is caused by :**
- (A) Pseudomonas spp (B) Aspergillus spp
(C) Bacillus spp (D) Candida spp
- 55. Which of the following carbohydrates is NOT classified as dietary fibre ?**
- (A) Agar (B) Pectin
(C) Sodium alginate (D) Tapioca starch
- 56. Blanching influences vegetable tissues in terms of :**
- (A) enzymes production (B) alteration of cytoplasmic membrane
(C) stabilization of cytoplasmic proteins (D) stabilization of nuclear proteins
- 57. Quantitative measurement of the roughness of a polysilicon wafers can be performed with :**
- (A) scanning tunneling microscopy (B) scanning electron microscopy
(C) transmission electron microscopy (D) atomic force microscopy
- 58. The temperature of the antiferromagnetic-to-paramagnetic transition is called :**
- (A) Curie temperature (B) Curie-Weiss temperature
(C) Neel temperature (D) Debye temperature
- 59. Which of the following mechanical properties of a material depend on the mobile dislocation density in it ?**
- (P) Young's modulus (Q) yield strength (R) ductility (S) fracture toughness
- (A) P, Q, R (B) Q, R, S
(C) P, R, S (D) S, P, Q

- 60. A small container has gas at high pressure. It is placed in an evacuated space. If the container is punctured, work done by the gas is :**
- (A) Positive (B) Negative
(C) Zero (D) ∞
- 61. The efficiency of a reversible engine operating between two temperatures is 40 %. The COP of a reversible refrigerator operating between the same temperatures is :**
- (A) 1.5 (B) 2.5
(C) 0.4 (D) 3.5
- 62. The minimum and maximum volumes in an air standard Otto cycle are 100 and 800 cm³. Its thermal efficiency (%) is :**
- (A) 56.47 (B) 94.55
(C) 54.08 (D) 87.50
- 63. Elastomers are characterized by :**
- (A) high modulus and high elongation at break (B) high modulus and low elongation at break
(C) low modulus and high elongation at break (D) low modulus and low elongation at break
- 64. Liver necrosis may be caused by the deficiency of :**
- (A) Vitamin A (B) Vitamin D
(C) Vitamin K (D) Vitamin E
- 65. When the atoms in a solid are separated by their equilibrium distance :**
- (A) the potential energy of the solid is lowest
(B) the force of attraction between the atoms is maximum
(C) the force of repulsion between the atoms is zero
(D) the potential energy of the solid is zero

66. To which of the following category of materials does Teflon (PTFE) belong?

- (A) Thermosets (B) Thermoplastics
(C) Elastomers (D) Block copolymers

67. Which is NOT a ceramic forming process ?

- (A) extrusion (B) slip casting
(C) forging (D) tape casting

68. Vacancies play an important role in :

- (A) deformation twinning (B) self diffusion
(C) strain hardening (D) cross-slip

69. The biodegradable polymer among the following polymers is :

- (A) poly (lactic acid) (B) poly (butylene terephthalate)
(C) polystyrene (D) polypropylene

70. In IC technology, dry oxidation (using dry oxygen) as compared to wet oxidation (using steam or water vapor) produces :

- (A) superior quality oxide with a higher growth rate (B) inferior quality oxide with a higher growth rate
(C) inferior quality oxide with a lower growth rate (D) superior quality oxide with a lower growth rate

71. In a MOSFET operating in the saturation region, the channel length modulation effect causes :

- (A) an increase in the gate-source capacitance (B) a decrease in the transconductance
(C) a decrease in the unity-gain cutoff frequency (D) a decrease in the output resistance

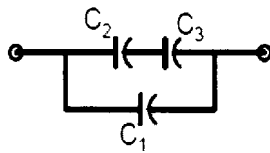
72. A polynomial $f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x - a_0$ with all coefficients positive has

- (A) no real roots (B) no negative real root
(C) odd number of real roots (D) at least one positive and one negative root

73. Two magnetically uncoupled inductive coils have Q factors q_1 and q_2 at the chosen operating frequency. Their respective resistances are R_1 and R_2 . When connected in series, their effective Q factor at the same operating frequency is :

- (A) $q_1 + q_2$ (B) $(1/q_1) + (1/q_2)$
 (C) $(q_1 R_1 + q_2 R_2) / (R_1 + R_2)$ (D) $(q_1 R_2 + q_2 R_1) / (R_1 + R_2)$

74. Three capacitors C_1 , C_2 and C_3 whose values are 10mF, 5mF, and 2mF respectively, have breakdown voltages of 10V, 5V, and 2V respectively. For the interconnection shown below, the maximum safe voltage in Volts that can be applied across the combination, and the corresponding total charge in mC stored in the effective capacitance across the terminals are respectively :



- (A) 2.8 and 36 (B) 7 and 119
 (C) 2.8 and 32 (D) 7 and 80

75. In a Hall effect experiment, the Hall voltage for an intrinsic semiconductor is negative. This is because (symbols carry usual meaning) :

- (A) $n \approx p$ (B) $n > p$
 (C) $m_e > m_n$ (D) $m_e^* > m_h^*$

ROUGH WORK

ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M.Tech. (Polymer)

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **The number of degrees of freedom for a mixture of ice and water (liquid) are :**
(A) 2 (B) 1
(C) 0 (D) 3

2. **A pitot tube indicates pressure difference of 5 cm of water when it is being used for measuring velocity of air. Considering $g = 10 \text{ m/s}^2$, density of air = 1.23 kg/m^3 , the velocity of air (m/s) is :**
(A) 5 (B) 14.1
(C) 56.22 (D) 28.5

3. **Bernoulli equation is based upon :**
(A) The second law of motion (B) The third law of motion
(C) Conservation of momentum (D) Conservation of energy

4. **The volume of liquid flowing per second out of an orifice at the bottom of a tank does not depend on :**
(A) The area of the orifice (B) The height of the liquid above the orifice
(C) The density of the liquid (D) The value of the acceleration due to gravity

5. **Atmospheric pressure does not correspond to approximately :**
(A) 14.7 lb/in^2 (B) 98 N/m^2
(C) 1013 mb (D) 2120 lb/ft^2

6. **A cork 2 cm in radius is used to close one end of a tube whose other end is connected to a vacuum pump. The pump virtually removes all the air from the tube. The force (N) needed to pull the cork out would be :**
(A) 127 (B) 101
(C) 184 (D) 12.7

7. The effectiveness of a heat exchanger in the e-NTU method is defined as :

- (A) $\frac{\text{Increase in temperature of cold fluid}}{\text{Decrease in temperature of hot fluid}}$
- (B) $\frac{\text{Actual exit temperature attained by the cold fluid}}{\text{Maximum exit temperature attainable by the cold fluid}}$
- (C) $\frac{\text{Actual exit temperature attained by the hot fluid}}{\text{Minimum exit temperature attainable by the hot fluid}}$
- (D) $\frac{\text{Actual heat transfer rate}}{\text{Maximum possible heat transfer rate from hot fluid to cold fluid}}$

8. The dimensionless group in mass transfer that is equivalent to Prandtl number in heat transfer

is :

- (A) Nusselt number (B) Sherwood number
(C) Schmidt number (D) Stanton number

9. In a pool boiling experiment, the following phenomena were observed

- P. Natural convection
Q. Film boiling
R. Transition boiling
S. Nucleate boiling

What was the CORRECT sequence of their occurrence ?

- (A) P, Q, R, S (B) S, R, Q, P
(C) Q, R, P, S (D) P, S, R, Q

10. Taking the acceleration due to gravity to be 10 m/s^2 , the separation factor of a cyclone 0.5 m in diameter and having a tangential velocity of 20 m/s near the wall is :

- (A) 80 (B) 160
(C) 8 (D) 16

11. Slurries are most conveniently pumped by a :

- (A) Reciprocating pump (B) Diaphragm pump
(C) Vacuum pump (D) Gear pump

12. A hole of area 1 cm^2 is opened on the surface of a large spherical cavity whose inside temperature is maintained at 727°C . The value of Stefan-Boltzmann constant is $5.67 \times 10^{-8} \text{ W/m}^2\text{-K}^4$. Assuming black body radiation, the rate at which the energy is emitted (in W) by the cavity through the hole is :

- (A) 1.58 (B) 56.7
(C) 15.8 (D) 5.67

13. Match the materials in Column I with descriptions in Column II :

Column-I	Column-II
P. Polyacrylonitrile	1. Hard and brittle material
Q. Nylon-6, 6	2. Very high temperature resistant material
R. Polytetrafluoroethylene	3. H-bonding
S. Ebonite	4. Acrylic fibre
	5. Rubber
	6. Polyester fibre
(A) P-6, Q-3, R-2, S-1	(B) P-2, Q-6, R-4, S-5
(C) P-4, Q-2, R-6, S-5	(D) P-4, Q-3, R-2, S-1

14. If the Nusselt number for heat transfer in a pipe varies with Reynolds number as $\text{Nu} \propto \text{Re}^{0.8}$, then for constant average velocity in the pipe, heat transfer coefficient varies with the pipe diameter D as :

- (A) $D^{-1.8}$ (B) $D^{-0.2}$
(C) $D^{0.2}$ (D) $D^{1.8}$

15. In a counter flow double pipe heat exchanger, oil ($m = 2 \text{ kg/s}$, $C_p = 2.1 \text{ kJ/kg } ^\circ\text{C}$) is cooled from 90°C to 40°C by water ($m = 1 \text{ kg/s}$, $C_p = 4.2 \text{ kJ/kg } ^\circ\text{C}$) which enters the inner tube at 10°C . The radius of the inner tube is 3 cm and its length is 5 m . Neglecting the wall resistance, the overall heat transfer coefficient based on the inner radius, in $\text{kW/m}^2\text{K}$ is :

- (A) 0.743 (B) 7.43
(C) 74.3 (D) 2475

16. The one dimensional unsteady state heat conduction equation in a hollow cylinder with a constant heat source q is :

$$\frac{\partial T}{\partial t} = \frac{1}{r} \frac{\partial}{\partial r} \left(r \frac{\partial T}{\partial r} \right) + q$$

If A and B are arbitrary constants, then the steady state solution to the above equation is :

- (A) $T(r) = -\frac{qr^2}{2} + \frac{A}{r} + B$ (B) $T(r) = -\frac{qr^2}{4} + A \ln r + B$
- (C) $T(r) = A \ln r + B$ (D) $T(r) = \frac{qr^2}{4} + A \ln r + B$

17. The estimation of the molecular weight of a polymer by gel permeation chromatography (GPC) is based on its :

- (A) polarity (B) size
(C) adsorption to stationary phase (D) crystallinity

18. A thermometer initially at 100°C is dipped at $t = 0$ into an oil bath, maintained at 150°C . If the recorded temperature is 130°C after 1 minute, then the time constant of the thermometer (in min) is :

- (A) 1.98 (B) 1.35
(C) 1.26 (D) 1.09

19. In the McCabe Thiele diagram, if the x-coordinate of the point of intersection of the q -line and the vapour-liquid equilibrium curve is greater than the x-coordinate of the feed point, then the quality of the feed is :

- (A) Super heated vapour (B) Liquid below bubble point
(C) Saturated vapour (D) Saturated liquid

20. For an exothermic reversible reaction, which one of the following correctly describes the dependence of equilibrium constant (K) with temperature (T) and pressure (P) ?

- (A) K is independent of T and P
(B) K increases with increase in T and P
(C) K increases with T and decreases with P
(D) K decreases with an increase in T and is independent of P

21. If the temperature of saturated water is increased infinitesimally at constant entropy, the resulting state of water will be :
- (A) Liquid (B) Liquid-vapour coexistence
(C) Saturated vapour (D) Solid
22. In an isotactic polymer :
- (A) The side groups on a polymer chain are all generally on the same side of the polymer chain
(B) The side groups of the polymer chain generally alternate their orientation from one side to the other
(C) The side groups of the polymer chain occur randomly on both sides of the polymer chain
(D) There are no side groups on the side chain
23. The function $f(x) = 3x(x - 2)$ has a :
- (A) Minimum at $x = 1$ (B) Maximum at $x = 1$
(C) Minimum at $x = 2$ (D) Maximum at $x = 2$
24. A wet solid is dried over a long period of time by unsaturated air of nonzero constant relative humidity. The moisture content eventually attained by the solid is termed as the :
- (A) unbound moisture content (B) bound moisture content
(C) free moisture content (D) equilibrium moisture content
25. The angle between two vectors $2\mathbf{i} - \mathbf{j} + \mathbf{k}$ and $\mathbf{i} + \mathbf{j} + 2\mathbf{k}$ is :
- (A) 0° (B) 30°
(C) 45° (D) 60°
26. In the Tyler standard screen scale series, when the mesh number increases from 3 mesh to 10 mesh, then :
- (A) the clear opening decreases (B) the clear opening increases
(C) the clear opening is unchanged (D) the wire diameter increases
27. Standard pipes of different schedule numbers and standard tubes of different BWG numbers are available in the market. For a pipe/tube of a given nominal diameter, which one of the following statements is TRUE ?
- (A) Wall thickness increases with increase in both the schedule number and the BWG number
(B) Wall thickness increases with increase in the schedule number and decreases with increase in the BWG number
(C) Wall thickness decreases with increase in both the schedule number and the BWG number
(D) Neither the schedule number, nor the BWG number has any relation to wall thickness

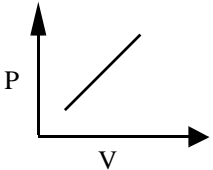
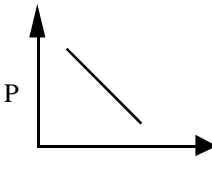
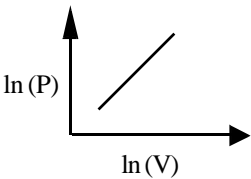
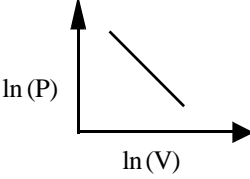
28. Hydrogen iodide decomposes through the reaction $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$. The value of the universal gas constant R is $8.314 \text{ J mol}^{-1}\text{K}^{-1}$. The activation energy for the forward reaction is $184000 \text{ J mol}^{-1}$. The ratio (rounded off to the first decimal place) of the forward reaction rate at 600 K to that at 550 K is :

- (A) 15.6 (B) 38.2
(C) 28.6 (D) 56.7

29. In order to achieve the same conversion under identical reaction conditions and feed flow rate for a non-autocatalytic reaction of positive order, the volume of an ideal CSTR is :

- (A) always greater than that of an ideal PFR
(B) always smaller than that of an ideal PFR
(C) same as that of an ideal PFR
(D) smaller than that of an ideal PFR only for first order reaction

30. In a closed system, the isentropic expansion of an ideal gas with constant specific heats is represented by :

- (A)  (B) 
(C)  (D) 

31. The second order Taylor series expansion for a function $f(x) = x^2$ at $x = 1$:

- (A) x^2 (B) $1 + x^2$
(C) $1 + x + x^2$ (D) $1 - x + x^2$

32. The ends of a cylindrical vessel can be closed by a head, which can be one of the four shapes. For the same thickness, choose the one which can withstand highest pressure :

- (A) flat plate (B) hemispherical
(C) torispherical (D) ellipsoidal

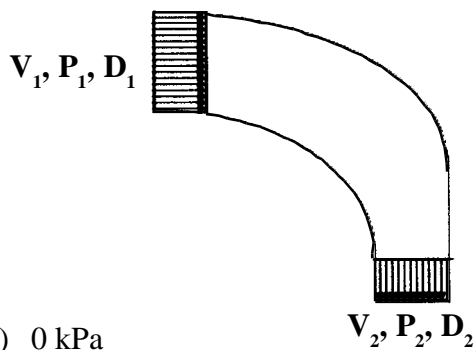
33. Air enters an adiabatic compressor at 300 K. The exit temperature for a compression ratio of 3, assuming air to be an ideal gas ($\gamma = C_p/C_v = 7/5$) and the process to be reversible is :
- (A) $300(3^{2/7})$ (B) $300(3^{3/5})$
 (C) $300(3^{3/7})$ (D) $300(3^{5/7})$

34. The overall heat transfer coefficient for a shell and tube heat exchanger for clean surfaces is $U_o = 400 \text{ W/m}^2\text{K}$. The fouling factor after one year of operation is found to be $h_{do} = 2000 \text{ W/m}^2\text{K}$. The overall heat transfer coefficient at this time is :
- (A) $1200 \text{ W/m}^2\text{K}$ (B) $894 \text{ W/m}^2\text{K}$
 (C) $333 \text{ W/m}^2\text{K}$ (D) $287 \text{ W/m}^2\text{K}$

35. In a cylindrical vessel subjected to internal pressure, the longitudinal stress (s_l) and circumferential stress (s_h) are related by :
- (A) $\sigma_h = 2\sigma_l$ (B) $\sigma_h = \sigma_l$
 (C) $\sigma_h = \sigma_l/2$ (D) No relation exists

36. In the converter of the contact process for the manufacture of sulphuric acid, the equilibrium conversion of SO_2
- (a) _____ with increase in the temperature and
 (b) _____ with increase in the mole ratio of SO_2 to air :
- (A) (a) increases (b) decreases (B) (a) decreases (b) increases
 (C) (a) increases (b) increases (D) (a) decreases (b) decreases

37. The inlet velocity of water ($\rho = 1000 \text{ kg/m}^3$) in a right-angled bend-reducer is $V_1 = 1 \text{ m/s}$ as shown in the figure. The inlet diameter is $D_1 = 0.8 \text{ m}$ and the outlet diameter is $D_2 = 0.4 \text{ m}$. The flow is turbulent and the velocity profiles at the inlet and outlet are flat (plug flow). Gravitational forces are negligible. The pressure drop across the bend assuming negligible friction losses is :



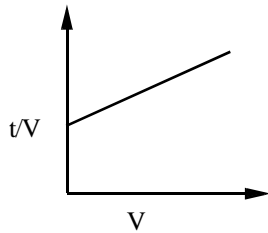
- (A) 0 kPa (B) 750 kPa
 (C) 7.5 kPa (D) 7500 kPa

38. The volumetric flow rate during constant pressure filtration is :

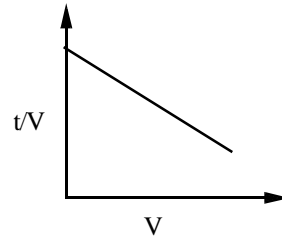
$$\frac{dV}{dt} = \frac{1}{K_c V + \frac{1}{q_0}}$$

where V is the total volume of the filtrate collected in time t , and K_c and q_0 are constants. The plot of t/V versus V is :

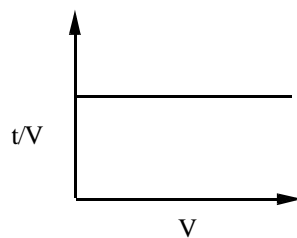
(A)



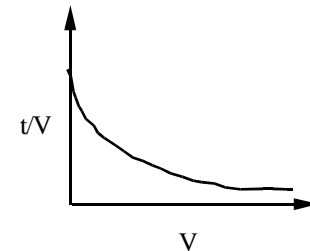
(B)



(C)



(D)



39. The first order gas phase reaction $A \xrightarrow{k} 2B$ is conducted isothermally in batch mode. The rate of change of conversion with time is given by :

(A) $\frac{dx_A}{dt} = k(1 - x_A)^2(1 + 2x_A)$

(B) $\frac{dx_A}{dt} = k(1 - x_A)$

(C) $\frac{dx_A}{dt} = k(1 - x_A)^2(1 + 0.5x_A)$

(D) $\frac{dx_A}{dt} = \frac{k(1 - x_A)}{(1 + x_A)}$

40. If h represents viscosity of polymer solution and h_0 represents viscosity of pure solvent, then the specific viscosity of the polymer solution is expressed as :

(A) $\frac{\eta}{\eta_0}$

(B) $\frac{\eta}{\eta_0} - 1$

(C) $\frac{\eta_0}{\eta} - 1$

(D) $\frac{\eta_0}{\eta}$

41. The steady state heat flux (from outside to inside) across an insulating wall with thermal conductivity $k = 0.04 \text{ W/mK}$ and thickness 0.16 m is 10 W/m^2 . The temperature of the inside wall is -5°C . The outside wall temperature is :
- (A) 25°C (B) 30°C
(C) 35°C (D) 40°C
42. A butane isomerisation process produces 70 kmol/h of pure isobutene. A purge stream removed continuously contains 85% n-butane and 15% impurity (mole%). The feed stream is n-butane containing 1% impurity (mole%). The flow rate of the purge stream will be :
- (A) 3 kmol/h (B) 4 kmol/h
(C) 5 kmol/h (D) 6 kmol/h
43. High pressure steam is expanded adiabatically and reversibly through a well insulated turbine which produces some shaft work. If the enthalpy change and entropy change across the turbine are represented by ΔH and ΔS respectively, for this process :
- (A) $\Delta H = 0$ and $\Delta S = 0$ (B) $\Delta H \neq 0$ and $\Delta S = 0$
(C) $\Delta H = 0$ and $\Delta S \neq 0$ (D) $\Delta H \neq 0$ and $\Delta S \neq 0$
44. Which one of the following metals is commonly alloyed with iron to improve its corrosion resistance ?
- (A) Co (B) Cr
(C) Ti (D) Nb
45. The number of slip systems in a metal with FCC crystal structure is :
- (A) 4 (B) 6
(C) 8 (D) 12
46. Upon recrystallization of a cold worked metal :
- (A) strength increases and ductility decreases (B) strength decreases but ductility increases
(C) both strength and ductility increase (D) both strength and ductility decrease

- 47. Vulcanization is related to :**
- (A) strengthening of rubber (B) extrusion
(C) injection moulding (D) addition polymerisation
- 48. The average value of function $f(x) = x^3$ in the interval $0 \leq x \leq 2$ is :**
- (A) 1 (B) 2
(C) 4 (D) 8
- 49. Minimum reflux ratio in a distillation column results in :**
- (A) Optimum number of trays (B) Minimum reboiler size
(C) Maximum condenser size (D) Minimum number of trays
- 50. 1000 kg of a solution containing 50% by weight of a salt dissolved in it is cooled. 400 kg of anhydrous salt is precipitated out. The solubility of the salt at lower temperature (in kg/100 kg water) is :**
- (A) 80 (B) 50
(C) 40 (D) 20
- 51. Shear stress in a fluid flowing in a round pipe :**
- (A) Remains constant over the cross section
(B) Is zero at the centre and varies linearly with the radius of the pipe
(C) Is zero at the wall and increases linearly to the centre
(D) Varies parabolically across the cross-section
- 52. A high molecular weight polyethylene has an average molecular weight of 560,00 g/mol. Its average degree of polymerisation is :**
- (A) 15,000 (B) 18,660
(C) 19,310 (D) 20,000

53. Match the terms in column I with details of phase transformation in column II. (indicates cooling) :

Column-I	Column-II
P. Eutectic	1. $L + \alpha \rightarrow \beta$
Q. Monotectic	2. $\gamma \rightarrow \alpha + \beta$
R. Eutectoid	3. $L \rightarrow \alpha + \beta$
S. Peritectic	4. $\alpha + \beta \rightarrow \gamma$
	5. $L_1 \rightarrow \alpha + L_2$
(A) P-1, Q-5, R-4, S-3	(B) P-3, Q-4, R-2, S-1
(C) P-3, Q-5, R-2, S-1	(D) P-5, Q-2, R-4, S-1

54. Match the properties in Column I with appropriate units in Column II :

Column-I	Column-II
P. Viscosity	1. m^2s^{-1}
Q. Diffusivity	2. $Kg\ mm^{-2}$
R. Charge mobility	3. $Nm^{-2}s$
S. Fracture toughness	4. $m^2V^{-1}s^{-1}$
	5. $MPa\ m^{1/2}$
(A) P-3, Q-4, R-1, S-2	(B) P-4, Q-1, R-2, S-5
(C) P-5, Q-4, R-1, S-2	(D) P-3, Q-1, R-4, S-5

55. The diverging limb of a venturimeter is kept longer than the converging limb to :

- | | |
|--|---------------------------------------|
| (A) Ensure that the flow remains laminar | (B) Avoid separation |
| (C) Ensure that the flow remains turbulent | (D) Avoid formation of boundary layer |

56. Three forces acting on a particle are given as,

$$F_1 = (5i + 6j)N, F_2 = (-i + 4k)N \text{ and } F_3 = (i + 6j + 16k)N$$

where i, j, k are unit vectors along Cartesian coordinate axes. Which one of the following statements is true ?

- (A) Forces are coplanar and the particle is in equilibrium
- (B) Forces are coplanar but the particle is not in equilibrium
- (C) Forces are not coplanar but the particle is in equilibrium
- (D) Forces are not coplanar and the particle is not in equilibrium

57. An object of mass 'm' in a wooden box having a mass 'M' falls through a height 'h' under the influence of gravity in vacuum. The work done by the object on the box is :

- (A) 0
- (B) mgh
- (C) Mgh
- (D) (m + M)gh

58. A heat pump which operates in a cycle, extracts heat energy from the cold reservoir and supplies the same amount of energy to the hot reservoir. Which of the following statements holds for this process ?

- (A) This process violates both the First and the Second law
- (B) This process violates the First law but not the Second law
- (C) This process violates the Second law but not the First law
- (D) This process does not violate both the First and the Second law

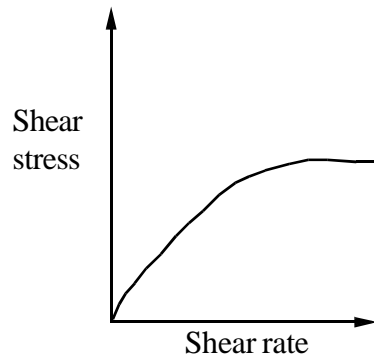
59. A low carbon steel sample is water quenched from 900 °C to room temperature. Its microstructure will consist of :

- (A) pearlite
- (B) bainite
- (C) martensite
- (D) ferrite and pearlite

60. A Frenkel defect is :

- (A) A pair of cation and anion vacancy
- (B) A pair of cation interstitial and cation vacancy
- (C) A cation vacancy
- (D) An anion vacancy

61. The change of shear stress with shear strain of a material as shown in the figure indicates :



- (A) Viscosity increase with increase in shear rate
- (B) Viscosity decrease with increase in shear rate
- (C) Viscosity remaining independent on shear rate
- (D) Viscosity oscillation with increase in shear rate

62. Which one of the following reagents is used to prevent coagulation of natural rubber latex ?

- (A) Ammonia (B) Acetic acid
(C) Toly mercaptan (D) Sodium chloride

63. The unit of shear rate is :

- (A) m^3s^{-1} (B) m^2s^{-1}
(C) ms^{-1} (D) s^{-1}

64. A plastic/material having the highest toughness exhibits :

- (A) High tensile strength and low elongation (B) Low tensile strength and high elongation
(C) High tensile strength and high elongation (D) Low tensile strength and low elongation

65. The correct statement on saponification is :

- (A) Fat with high amount of low molecular weight fatty acids will have high saponification number
(B) Butter has slow saponification number
(C) Fatty acids with long carbon chains have high saponification number
(D) Fat with low Reichert-Meissl number has very high saponification number

66. Given that V , L and g are the characteristic velocity, characteristic length and acceleration due to gravity, respectively, the expression $\frac{V}{\sqrt{Lg}}$ represents :

- (A) Weber number (B) Euler number
(C) Cavitation number (D) Froude number

67. Match the devices in Column I with characteristics in Column II :

- | Column-I | Column-II |
|------------------|---------------------------------|
| P. orifice meter | 1. high head loss and low cost |
| Q. venturi meter | 2. high head loss and high cost |
| | 3. low head loss and high cost |
| | 4. low head loss and low cost |
| (A) P – 2, Q – 4 | (B) P – 1, Q – 2 |
| (C) P – 3, Q – 1 | (D) P – 1, Q – 4 |

68. Which of the following signals is produced due to the elastic scattering of electrons by a material ?

- (A) Secondary electron
- (B) Backscattered electron
- (C) Auger electron
- (D) Photoelectron

69. Match the properties in column I with the options in Column II :

- | Column-I | Column-II |
|------------------------|---|
| P. Toughness | 1. Resistance to plastic deformation |
| Q. Resilience | 2. Time dependent permanent deformation under constant load |
| R. Creep | 3. Total elongation at failure |
| S. Hardness | 4. Area under the stress-strain curve |
| | 5. Area under the elastic part of the stress-strain curve |
| (A) P-5, Q-1, R-3, S-2 | (B) P-4, Q-3, R-2, S-1 |
| (C) P-4, Q-5, R-2, S-1 | (D) P-5, Q-4, R-3, S-2 |

70. In petroleum refining, the process used for conversion of hydrocarbons to aromatics is :

- (A) Catalytic cracking
- (B) Hydrotreating
- (C) Catalytic reforming
- (D) Alkylation

71. Styrene-butadiene rubber is commercially manufactured by :

- (A) Bulk polymerisation
- (B) Suspension polymerisation
- (C) Solution polymerisation
- (D) Emulsion polymerisation

72. Which of the following is NOT a Bravais lattice ?

- (A) Simple tetragonal
- (B) Body centered tetragonal
- (C) Base centered orthorhombic
- (D) Face centered tetragonal

73. Which one of the following expressions represents the Joule-Thompson coefficient ?

(A) $\left(\frac{\partial T}{\partial P}\right)_H$

(B) $\left(\frac{\partial T}{\partial V}\right)_H$

(C) $\left(\frac{\partial P}{\partial H}\right)_S$

(D) $\left(\frac{\partial S}{\partial T}\right)_P$

74. A fully developed laminar flow is taking place through a pipe. If the flow velocity is doubled maintaining the flow laminar, the pressure loss would be :

(A) halved

(B) unaltered

(C) doubled

(D) trebled

75. Polyurethane is formed by :

(A) Self condensation of polyols

(B) Self condensation of diisocyanate

(C) Reaction of polyol and diisocyanate

(D) Reaction of polyol with adipic acid



ROUGH WORK



ROUGH WORK



ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : Masters in Public Health

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. Which of the following is TRUE about fetal growth in womb ?
(A) By week 2 heart blood vessels start forming (B) By week 8 fetus is fully formed
(C) By week 10 eyelids open (D) By week 20 hair begin to grow

2. Choose a word from the following to fill in the BLANK to gel with the series:
Pituitary: Thyroid: Pancreas:_____.
(A) Adrenal (B) Heart
(C) Kidney (D) Liver

3. Choose a word from the following to fill in the BLANK to gel with the series:
Groundnuts: Sesame: Mustard:_____.
(A) Cereals (B) Legumes
(C) Leafy vegetables (D) Oilseeds

4. Which of the following is NOT an advantage of ground water (wells) as compared to surface water (river) as a source of drinking water ?
(A) It usually requires less or no treatment (B) It is more likely to be free from pathogens
(C) Its supply is better even in dry season (D) It is high in mineral contents

5. Which of the following items DOES NOT belong in the group ?
(A) Curd (B) Butter
(C) Oil (D) Cheese

6. Which of the following items DOES NOT belong in the group?
(A) Carrot (B) Potato
(C) Tomato (D) Ginger

7. Which of the following items DOES NOT belong in the group ?
(A) Cornea (B) Iris
(C) Medulla (D) Retina

8. Which of the following items DOES NOT belong in the group ?
(A) Entomology (B) Pathology
(C) Mycology (D) Astrology

9. Which of the following pair of words has similar relationship as in PESTICIDE : PLANT ?
(A) Infection : Disease (B) Vaccine : Body
(C) Medicine : Cure (D) Smear : Diagnosis

- 10. Which of the following pairs of words has similar relationship as in CEREALS : GRIT ?**
- (A) Infection : Turmeric (B) Milk : Sugar
(C) Pulses : Metanil (D) Eggs : Protein
- 11. Which of the following items DOES NOT belong in the group ?**
- (A) Lipase (B) Pepsin
(C) Ptyalin (D) Sucrose
- 12. Which of the following items DOES NOT belong in the group ?**
- (A) Thyroxine (B) Insulin
(C) Adrenalin (D) Iodine
- 13. Which of the following items DOES NOT belong in the group ?**
- (A) Diphtheria (B) Influenza
(C) Typhoid (D) Plague
- 14. Which of the following pairs of words DOES NOT share the same relationship as in other pairs ?**
- (A) Proteins: Marasmus (B) Iodine: Goitre
(C) Iron: Anemia (D) Sodium: Rickets
- 15. Which of the following is a meaningful sequence made from the words - Doctor, Fever, Medicine, Medical shop ?**
- (A) Fever, Doctor, Medical shop, Medicine (B) Doctor, Medical shop, Medicine, Fever
(C) Medical shop, Doctor, Fever, Medicine (D) Medicine, Doctor, Medical shop, Fever
- 16. Which of the following vitamins affects metabolism of calcium in our body ?**
- (A) Vitamin A (B) Vitamin B
(C) Vitamin C (D) Vitamin D
- 17. What is the recommended level of Fluorides in water for India ?**
- (A) Below 0.5 PPM (B) 0.5-0.8 PPM
(C) 1.0-2.5 PPM (D) Above 2.5 PPM
- 18. Of the 4 diseases listed below which one has maximum cases in India at present ?**
- (A) Plague (B) Guinea worm disease
(C) Leishmaniasis (D) Yaws

- 19. Which of the following is the peak season for typhoid in India ?**
- (A) January - March (B) April - June
(C) July - September (D) October - December
- 20. Hardness of water should be in the range of :**
- (A) Less than 1 m eq / lit (B) 1-3 m eq / lit
(C) 3-6 m eq / lit (D) More than 6 m eq / lit
- 21. Which of the following SHOULD NOT be disinfected by autoclaving ?**
- (A) Used apron of surgeons (B) Scalpel blades
(C) Glass equipments like syringes (D) Sputum of TB patients
- 22. Biochemical Oxygen Demand reflects :**
- (A) Purity of water
(B) Strength of sewage
(C) Amount of bleaching powder needed for water purification
(D) Proneness of cyanosis in neonates
- 23. Which of the following gases has maximum green house effect ?**
- (A) Carbon dioxide (B) Methane
(C) Ozone (D) Water vapor
- 24. Pigeon chest results from :**
- (A) Fluorosis (B) Rickets
(C) Lathyrism (D) Epidemic dropsy
- 25. In 10 children aged 2 yrs weight recording was 10 kg for each child. It can be concluded that :**
- (A) Mean = 10, mode = 10, median = 10, standard deviation = 0
(B) Mean = 1, mode = 1, median = 1, standard deviation = 0
(C) Mean = 10, mode = 10, median = 1, standard deviation = 1
(D) Mean = 10, mode = 0, median = 1, standard deviation = 0
- 26. Which of the following is TRUE about septic tank ?**
- (A) It is always double chambered
(B) Its minimum capacity should be at least 500 gallons
(C) No air space is required in its chamber
(D) It involves only anaerobic method of treatment of waste

- 27. Which of the following climate type label is used for England ?**
(A) Temperate (B) Tropical
(C) Subtropical monsoon (D) Tundra
- 28. Vector for leishmaniasis is :**
(A) Sandfly (B) Tse tse fly
(C) Black fly (D) Dragonfly
- 29. Local wound treatment of dog bite reduces the chances of rabies by :**
(A) 0% (B) 10%
(C) 40% (D) 80%
- 30. Which of the following is a poor source of iron ?**
(A) Meat (B) Spinach
(C) Jaggery (D) Butter
- 31. Which of the following is TRUE about hemophilia in children if an affected male marries a normal female :**
(A) defective gene is transferred to all daughters (B) defective gene is transferred to all sons
(C) 50% daughters are carriers (D) 50 % sons are affected
- 32. Which of the following is TRUE about milestones of growth and development in a normal child ?**
(A) Sits without support at 3 months (B) Starts crawling at 6 months
(C) Holds head erect at 3 months (D) Starts running at 13 months
- 33. Which of the following river does not form a delta ?**
(A) Godavari (B) Tapi
(C) Ganga (D) Kaveri
- 34. Which of the following figure represents India's share of global land area ?**
(A) 2.4 % (B) 4.2%
(C) 5.2% (D) 7.4%
- 35. Which of the following trees is not found in dry tropical thorny vegetation ?**
(A) Acacia (B) Euphorbias
(C) *Chir* (D) Cactus

- 36. Which of the following rivers rise in the Western Ghats ?**
(A) Godavari, Krishna, Kaveri (B) Godavari, Ganga, Yamuna
(C) Ganga, Yamuna, Krishna (D) Krishna, Kaveri, Ganga
- 37. Which of the following is one of the routes of HIV-AIDS transmission ?**
(A) Swimming pool (B) Mosquito bite
(C) Shared razors (D) Shared meals
- 38. Which of the following theories deal with need hierarchy ?**
(A) Health Field theory (B) Maslow's theory
(C) Salutogenesis theory (D) Hardiness theory
- 39. Which of the following is the richest source of vitamin C ?**
(A) Amla (B) Cabbage
(C) Guava (D) Orange
- 40. Deficiency of which of the following causes Endemic Goiter ?**
(A) Fluorine (B) Iodine
(C) Iron (D) Protein
- 41. Which of the following is richest source of fat per unit weight ?**
(A) Black gram (B) Ground nut
(C) Maize (D) Soyabean
- 42. Which of the following is richest source of energy per unit weight ?**
(A) Apple (B) Banana
(C) Guava (D) Orange
- 43. Which of the following is an essential amino acid ?**
(A) Arginine (B) Glutamic acid
(C) Glycine (D) PhenylAlanine
- 44. Which of the following is the reason for naming some amino acids as essential amino acid?**
Since these are :
(A) Needed in large amount (B) Needed for brain metabolism
(C) To be obtained from outside sources (D) Essential for puberty growth spurt

- 45. Which of the following diseases can be transmitted through unsafe injections ?**
- (A) Amoebiasis (B) Cholera
(C) Hepatitis (D) Typhoid
- 46. Which of the following diseases is transmitted through mosquitoes ?**
- (A) Filaria (B) Measles
(C) Rubella (D) Typhus
- 47. Which of the following is TRUE about shallow wells ?**
- (A) These tap water from above first impervious layer
(B) These tap water from below first impervious layer
(C) These provide pure water
(D) These provide hard water
- 48. A sanitary latrine is the one which has :**
- (A) A water seal (B) Cemented floor
(C) Deodorants (D) Tap water supply
- 49. In which of the following diseases isolation of patients is not recommended ?**
- (A) Diphtheria (B) Plague
(C) Mumps (D) Rabies
- 50. Which of the following diseases is more prevalent in hilly areas ?**
- (A) Cancer breast (B) Filaria
(C) Goiter (D) Malaria
- 51. Which of the following diseases is an occupational hazard of nurses ?**
- (A) Botulism (B) Dental caries
(C) Otitis media (D) Hepatitis
- 52. Which of the following diseases is transmitted through water ?**
- (A) Byssinosis (B) Diphtheria
(C) Poliomyelitis (D) Tuberculosis
- 53. Which of the following diseases has the shortest incubation period in India ?**
- (A) Staphylococcal food poisoning (B) Cholera
(C) Plague (D) Syphilis

- 54. Which of the following represent the proportion of population below 15 yrs in India ?**
- (A) Less than 10 % (B) 10-15%
(C) 15-25% (D) More than 25 %
- 55. Fruits stored in cold chamber have longer shelf life because :**
- (A) Exposure to sunlight is prevented
(B) Concentration of carbon dioxide is increased
(C) Rate of respiration is decreased
(D) Humidity is increased
- 56. Which of the following terms describes not only the physical space occupied by an organism, but also its functional role in the community of organisms ?**
- (A) Ecozone (B) Ecological niche
(C) Habitat (D) Home range
- 57. As per Constitution of India, which of the following is fundamental to the governance of the country ?**
- (A) Fundamental Rights (B) Fundamental Duties
(C) Directive Principles of State Policy (D) Habeas Corpus
- 58. The largest number of people of India, are engaged in which sector of economy ?**
- (A) Primary (B) Secondary
(C) Tertiary (D) Quaternary
- 59. Which kind of economy is there in India ?**
- (A) Capitalist (B) Socialist
(C) State controlled (D) Mixed
- 60. Which of the following sequence is arranged in correct order of evolution of societies' economy ?**
- (A) Hunter-gatherer, Agrarian, Industrial, Service economy
(B) Agrarian, Hunter-gatherer, Service economy, Industrial
(C) Hunter-gatherer, Industrial, Agrarian, Service economy
(D) Agrarian, Industrial, Hunter-gatherer, Service economy
- 61. Which of the following is enforceable in a court of law of India ?**
- (A) Directive Principles (B) Fundamental Rights
(C) Fundamental Duties (D) Preamble

- 62. In the polity of India Governor is a representative of the :**
- (A) Prime Minister (B) President
(C) Home Minister (D) Chief Minister
- 63. In the polity of India for election to Lok Sabha the lowest cut off age for a potential candidate is :**
- (A) 25 yrs (B) 30 yrs
(C) 35 yrs (D) 40 yrs
- 64. Which of the following is TRUE of sociology ?**
- (A) Family is an institution
(B) Laws have NO LINK with norms
(C) Social stratification has ceased to exist in modern society
(D) Taboos have ceased to exist in modern society
- 65. Which of the following statements reflects the fatalistic attitude of people of India about the disease etiology?**
- (A) 'This disease is a part of my fate' (B) 'This disease is always fatal'
(C) 'This disease spreads very fast' (D) 'This disease has no cure'
- 66. Which of the following is TRUE about Human Genome Project ?**
- (A) It started in 2005
(B) This also focused on Genome of fruit fly and mouse
(C) Only 15 % of its goals have been achieved
(D) Genomes of human sex chromosomes were NOT studied
- 67. Which of the following is the meaning of the term XENOBIOTICS ?**
- (A) New generation antibiotics (B) Genetically engineered medicines
(C) Chemicals foreign to man (D) Science of gene therapy
- 68. Which of the following blood group has been designated as UNIVERSAL RECIPIENT ?**
- (A) A (B) B
(C) AB (D) O
- 69. Mature RBCs have NO role in :**
- (A) Glucose metabolism in body (B) ATP metabolism in body
(C) Oxygen transport in body (D) Protein synthesis

70. Which of the following is a protozoal disease ?

- (A) Kala azar
- (B) Syphilis
- (C) Chickenpox
- (D) Rabies

71. Which of the following diseases spread through insect bite ?

- (A) Trachoma
- (B) Gonorrhoea
- (C) Bubonic plague
- (D) Rabies

72. Which of the following is a gram positive bacteria ?

- (A) Pseudomonas aeruginosa
- (B) Chlamydia trachomatis
- (C) Yersinia pestis
- (D) Clostridium tetani

73. Which of the following is a source of passive antibodies ?

- (A) Breast milk
- (B) Infection
- (C) Oral live vaccine
- (D) Killed vaccine

74. Which of the following is TRUE of micro flora in human body ?

- (A) Passage of baby through birth canal frees it from microflora
- (B) Prior to birth baby is free of micro-organisms
- (C) During initial days after birth baby is free of micro-organisms
- (D) Normal micro flora never cause disease in humans

75. Which of the following is TRUE of staphylococci ?

- (A) These are incapable of respiratory metabolism
- (B) These CAN NOT ferment sugars
- (C) These are gram positive
- (D) These never cause disease in humans

ROUGH WORK

CET (PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : Masters in Disaster Management

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
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10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
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16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

1. **Common respiratory problem caused by Congress Grass :**
(A) Asthma (B) Bronchitis
(C) Hay fever (D) All of the above
2. **The term 'Ecology' was coined by :**
(A) Ernest Haeckel (B) Reiter
(C) Mivart (D) Hilaire
3. **Required forest cover for a country for proper ecological balance out of its total area is :**
(A) 23% (B) 33%
(C) 43% (D) 53%
4. **Which of the following is an in-situ conservation measure taken by India ?**
(A) Project Elephant (B) Project Lion
(C) Project Rhino (D) All of the above
5. **Lion-Tailed Macaque is found in ?**
(A) Western Ghats (B) Eastern Ghats
(C) Punjab Plains (D) Western Himalaya
6. **One of the major reasons for the accumulation of 'e-waste' in recent years is :**
(A) Lack of technologies for recycling (B) Rapid technology obsolescence
(C) Lack of strict regulations (D) All of the above
7. **Organic farming involves :**
(A) Use of organic acids
(B) Use of pesticides
(C) Use of saline water
(D) Cultivation without involving chemical fertilizers and pesticides
8. **The domestic waste that can be degraded by micro-organisms is called :**
(A) Non-Biodegradable waste (B) Biodegradable waste
(C) Hazardous waste (D) e-waste
9. **The direction of the wind in both the hemispheres is governed by :**
(A) Gay Lusaac's Law (B) Faraday's Law
(C) Ferrell's Law (D) Ohm's Law

- 10. The term 'Sustainable Development' was brought into common use by the :**
- (A) UNCED, 1992.
 - (B) Rio Declaration
 - (C) World Commission on Environment & Development, 1987
 - (D) Agenda 21
- 11. Our earth is in the shape of :**
- (A) Geoid
 - (B) Ellipse
 - (C) Parabola
 - (D) Sphere
- 12. Montreal Protocol is also called as :**
- (A) Treaty on Sustainable Development
 - (B) Ozone treaty
 - (C) Stockholm declaration
 - (D) Brundtland Commission
- 13. The land that has been destroyed due to mining activity is called :**
- (A) Agricultural land
 - (B) Derelict land
 - (C) Saline land
 - (D) Fertile land
- 14. pH value of potable water is :**
- (A) 10-11.5
 - (B) 6.5-8.0
 - (C) 3.0-5.0
 - (D) 10.0-11.0
- 15. Which of the following trees are grown for commercial purpose in social forestry ?**
- (A) Kikkar and Jamun
 - (B) Shi sham and Mango
 - (C) Safeda and Poplar
 - (D) Mango and Jamun
- 16. UNFCCC stands for :**
- (A) United Nations Framework Controversies on Climate Change
 - (B) United Nations Framework Convention on Climate Change
 - (C) United Nations Freedom Control on Climate Change
 - (D) United Nations Framework Convention on Carbon Credits
- 17. Which of the following is not an air pollutant ?**
- (A) Noise
 - (B) SO₂
 - (C) Surface run off
 - (D) NO₂
- 18. Chilka Lake is situated in :**
- (A) Himachal Pradesh
 - (B) Haryana
 - (C) Orissa
 - (D) Kerala

- 19. Which of the following is not a water borne disease ?**
(A) Schistosomiasis (B) Parkinson's disease
(C) Gastroenteritis (D) Typhoid
- 20. The greenhouse effect was discovered by :**
(A) John Tyndall (B) Joseph Fourier
(C) R. K. Pachauri (D) Arrhenius
- 21. Which is the largest ocean in the world ?**
(A) Arctic Ocean (B) Indian Ocean
(C) Pacific Ocean (D) Atlantic Ocean
- 22. Which of the following is NOT USED in Organic Farming ?**
(A) Crop Rotation (B) Organic Manures
(C) Bio Fertilizers (D) Synthetic Chemicals
- 23. The removal of carbon dioxide from the earth's atmosphere and the provision of long term storage of Carbon in the terrestrial biosphere is known as :**
(A) Carbon sequestration (B) Carbon dating
(C) Carbon emission (D) Photosynthesis
- 24. The term MAB stands for :**
(A) Man and Biology programme (B) Man and Biosphere programme
(C) Mammal and Biology programme (D) Mammal and Biosphere programme
- 25. Nitrogen constitutes _____ % of the atmosphere.**
(A) 99 (B) 21
(C) 15 (D) 10
- 26. Harike wetland is located in which Indian state ?**
(A) Goa (B) Haryana
(C) Punjab (D) Maharashtra
- 27. Which of the following deserts is located in India ?**
(A) Sahara Desert (B) Atacama Desert
(C) Kala Hari Desert (D) Thar Desert
- 28. World Environment Day is celebrated on :**
(A) 26th January (B) 2nd October
(C) 15th August (D) 5th June

- 29. Which gas protects us from UV radiation ?**
(A) Oxygen (B) Ozone
(C) Carbon (D) Nitrogen
- 30. Which of the following is a renewable resource ?**
(A) Wind (B) Coal
(C) Crude Oil (D) Petroleum
- 31. Coniferous forests are not found in ?**
(A) Rajasthan (B) Jammu and Kashmir
(C) Himachal Pradesh (D) Uttarakhand
- 32. Indian Agricultural Research Institute is located at :**
(A) Cuttack (B) New Delhi
(C) Shimla (D) Jaipur
- 33. Which of the following is not a part of Himalayan mountain system ?**
(A) Shivalik Range (B) Dhauladhar Range
(C) Pir-Panjab Range (D) Eastern Ghats
- 34. Output Device of a computer is :**
(A) Printer (B) Keyboard
(C) Monitor (D) CPU
- 35. The term GPS refers to :**
(A) Global Policy System (B) General Policy System
(C) Global Positioning System (D) None of the above
- 36. Which of the following rivers does not flow through Indian Punjab ?**
(A) Satluj (B) Krishna
(C) Ravi (D) Beas
- 37. Chandigarh is also known as :**
(A) 'The City of Joy' (B) 'The City of Gardens'
(C) 'Pink City' (D) 'The City Beautiful'
- 38. Chandigarh is the state capital of :**
(A) Haryana and UP (B) Punjab and Haryana
(C) Punjab and Himachal Pradesh (D) Himachal Pradesh and Haryana

39. 'Disaster Management Cycle' involves :

- (A) Disaster Preparedness
- (B) Disaster Mitigation
- (C) Disaster Rehabilitation
- (D) All of the above

40. Study of earthquakes is called :

- (A) Hydrology
- (B) Seismology
- (C) Etymology
- (D) Epistemology

41. Which of the following is a natural hazard ?

- (A) Chemical explosion
- (B) Earthquake
- (C) Industrial pollution
- (D) None of the above

42. 'First Aid' aims :

- (A) To prevent the victims condition from worsening
- (B) To preserve life
- (C) To promote recovery
- (D) All of the above

43. 'Biome' is a group of :

- (A) Plants
- (B) Animals
- (C) Ecosystems
- (D) Humans

44. Which is the main source of energy on Earth ?

- (A) Sun
- (B) Coal
- (C) Plants
- (D) Petroleum

45. Which of the following is 'fossil fuel' ?

- (A) Solar energy
- (B) Coal and petroleum
- (C) Plants
- (D) Wind

46. Which of the following is not a 'greenhouse gas' ?

- (A) Carbon-dioxide
- (B) Methane
- (C) Oxygen
- (D) Sulfur-dioxide

47. Green colour of plants is due to :

- (A) Iron
- (B) Methane
- (C) Chlorophyll
- (D) Oxygen

- 48. In nature, primary producers are :**
(A) Plants (B) Animals
(C) Humans (D) Industrial units
- 49. In an Ecosystem, consumers include :**
(A) Herbivores (B) Carnivores
(C) Omnivores (D) All of the above
- 50. Of the total global water, fresh water content is :**
(A) 90% (B) 50%
(C) 3% (D) 20%
- 51. Acid rain affects :**
(A) Forest cover (B) Agricultural crops
(C) Monuments and buildings (D) All of the above
- 52. In India, hunting was legally banned in :**
(A) 1970 (B) 2012
(C) 2010 (D) 2006
- 53. 'Wildlife Week' is celebrated on :**
(A) 1-7 January (B) 1-7 March
(C) 1-7 December (D) 1 -7 October
- 54. 'Vermiculture' uses which of the following :**
(A) Honey bees (B) Silk worms
(C) Earth worms (D) Flowers
- 55. 'Pedology' refers to the study of :**
(A) Soil (B) Water
(C) Air (D) Plants
- 56. 'Kaziranga' is famous for :**
(A) Cheetah (B) One-horned Rhino
(C) Black Bear (D) Black buck
- 57. 'Chipko Movement' was initiated by :**
(A) Bill Clinton (B) Narendra Modi
(C) Sunder Lal Bahuguna (D) Jawaharlal Nehru

58. Due to global warming it is expected that :

- (A) Sea level will remain the same (B) Sea level will fall
(C) Sea level will rise (D) None of the above

59. Growing more trees in 'Urban areas' is known as :

- (A) Urban forestry (B) Social forestry
(C) Agro forestry (D) Plantation

60. 'Valley of Flowers' is located in :

- (A) Tamil Nadu (B) Garhwal Himalayas
(C) Manipur (D) Gujarat

61. Which natural phenomena can cause forest fire :

- (A) Earthquake (B) Landslide
(C) Lightning (D) Cyclone

62. Which Indian states faced devastating forest fires in May 2016 :

- (A) Uttarakhand and Himachal Pradesh (B) Sikkim and Arunachal Pradesh
(C) Gujarat and Rajasthan (D) Goa and Kerala

63. Which Indian city is the largest producer of solid waste :

- (A) Shimla (B) Chandigarh
(C) Mumbai (D) Dehradun

64. Which is not a part of earth's interior :

- (A) Mantle (B) Atmosphere
(C) Core (D) Crust

65. 'Sukhna Lake' is situated in :

- (A) Delhi (B) Shimla
(C) Srinagar (D) Chandigarh

66. Who wrote the book 'Origin of the Species' ?

- (A) Charles Darwin (B) A.P.J. Kalam
(C) Mahatma Gandhi (D) J.K. Rowling

67. Which is not an aquatic ecosystem ?

- (A) Pond (B) Ocean
(C) Estuary (D) Forest

- 68. Excessively high rainfall in short span of time in a small area is called :**
- (A) Landslide (B) Cloudburst
(C) Drought (D) Acid rain
- 69. Tehri Dam is located in :**
- (A) Jammu and Kashmir (B) Punjab
(C) West Bengal (D) Uttarakhand
- 70. The Great Barrier Reef is located at the :**
- (A) East Australian Coast (B) Andaman and Nicobar Coast
(C) Arabian Sea (D) Gulf of Cambay
- 71. Which of the following takes maximum time to degenerate ?**
- (A) Glass (B) Wood
(C) Iron (D) Paper
- 72. Species that have a major impact on an ecosystem are called as :**
- (A) Flag species (B) Pioneer species
(C) Crown species (D) Keystone species
- 73. A cut-off river meander filled with stagnant water is known as :**
- (A) Delta (B) Oxbow lake
(C) Water pond (D) Estuary
- 74. In environmental management and conservation, which one is not a part of 3R approach ?**
- (A) Recycle (B) Reduce
(C) Reuse (D) Repair
- 75. What is the full form of NDMA ?**
- (A) National Disaster Management Authority (B) National Disaster Management Ability
(C) National Disaster Management Act (D) National Disaster Management Area

ROUGH WORK

CET (PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : Masters in Remote Sensing & GIS

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.**

- 1. Geography is the study of :**
(A) Physical and Human Features (B) Man and his Environment
(C) Money and Economics (D) Man and Animals

- 2. Which one of the following is associated with diastrophic forces ?**
(A) Glacial cycle of erosion (B) Weathering
(C) Karst topography (D) Emergence of coastline

- 3. A large mass of ice that flows slowly over land :**
(A) Permafrost (B) Tundra
(C) Glacier (D) Iceberg

- 4. The location of a place in relationship to other places or features around it is called :**
(A) Absolute location (B) Relative location
(C) Actual location (D) Global address

- 5. In which year the continental drift theory was proposed by Alfred Wegner :**
(A) 1928 (B) 1922
(C) 1932 (D) 1912

- 6. Modern geography traces its origins to the :**
(A) 17th century (B) 18th century
(C) 19th century (D) 20th century

- 7. The visible imprint of human activity is known as :**
(A) Spatial interaction (B) The attributes of the setting
(C) The cultural landscape (D) The natural landscape

- 8. The essential perspective used by geographers in forming their concepts is :**
(A) Absolute (B) Human
(C) Relative (D) Spatial

- 9. Natural levees are the product of the depositional work of :**
(A) Glaciers (B) Wind
(C) River (D) Groundwater

- 10. India's rich geographical variety encompasses almost all geographical features like mountains, lakes, waterfalls, deysers, plateaus etc. Which of the following features is not found in India ?**
- (A) Iceberg (B) Desert
(C) Glacier (D) Lagoon
- 11. Which of the following is an example of 'Horst' or 'Block Mountains' ?**
- (A) Vindhya (B) Nilgiris
(C) Himalayas (D) Siwaliks
- 12. The 500 miles long Great Boundary Fault (GBF) is roughly parallel to the course of.....?**
- (A) River Godavari (B) River Ganges
(C) River Chambal (D) River Gomti
- 13. India was separated from the Antartica complex about 140 million years (MY) ago. When did it join South Asia ?**
- (A) 120 MY ago (B) 80 MY ago
(C) 60 MY ago (D) 45 MY ago
- 14. Potholes are the erosional feature of :**
- (A) Rivers (B) Underground water
(C) Glaciers (D) Sea Waves
- 15. The Tropic of Cancer passes through :**
- (A) India and Iran (B) Iran and Pakistan
(C) India and Saudi Arabia (D) Iran and Iraq
- 16. The Core of the Earth is made up of :**
- (A) mainly of iron in the liquid form (B) mainly of nickel in the liquid form
(C) both iron and silica in the liquid form (D) both iron and magnesium in the plastic state
- 17. What is the actual shape of the Earth ?**
- (A) Flat (B) Circle
(C) Sphere (D) Oblate spheroid
- 18. Who among the following was the first to measure the circumference of the Earth ?**
- (A) Eratosthenes (B) Aristotle
(C) Hecataeus (D) Herodotus
- 19. 'Caldera' is a feature associated with :**
- (A) Volcanoes (B) Earthquakes
(C) Folding of rocks (D) Faulting of mountains



- 20. Molten rock below the surface of the earth is called :**
(A) Basalt (B) Laccolith
(C) Lava (D) Magma
- 21. Synclines and anticlines are the terms associated with :**
(A) Earthquakes (B) Faulting
(C) Folding (D) Volcanoes
- 22. Which of the following rivers has a 'bird's foot' delta ?**
(A) The Nile (B) The Mississippi
(C) The Brahmaputra (D) The Amazon
- 23. The cold and dense downslope wind flowing from the mountain slope during the night is known as :**
(A) Anabatic wind (B) Khamsin wind
(C) Harmattan wind (D) Katabatic wind
- 24. Atmospheric pressure generated on the earth's surface is due to :**
(A) Earth's rotation (B) Earth's revolution
(C) Gravitational force of the Earth (D) Moon's rotation
- 25. What is the correct sequence of the atmospheric layers from bottom-to-top ?**
(A) Mesosphere, Troposphere, Thermosphere, Stratosphere
(B) Troposphere, Stratosphere, Mesosphere, Thermosphere
(C) Stratosphere, Troposphere, Mesosphere, Thermosphere
(D) Thermosphere, Troposphere, Stratosphere, Mesosphere
- 26. Which instrument is used to measure the relative humidity in air ?**
(A) Hydrometer (B) Hygrometer
(C) Hygrograph (D) Barometer
- 27. The contact of two air masses differing sharply in humidity originates :**
(A) Stratospheric instability (B) Tropical cyclones
(C) Inter tropical convergence (D) Temperate cyclones
- 28. What causes smog ?**
(A) Water pollution (B) Earth's heat
(C) Air pollution (D) Tropical cyclones
- 29. Which one of the following is not a form of precipitation ?**
(A) Hail (B) Fog
(C) Snowfall (D) Rainfall

- 30. Shadow effect is associated with which one of the following rainfall ?**
- (A) Cyclonic rainfall (B) Orographic rainfall
(C) Convectional rainfall (D) Frontal rainfall
- 31. Climate represents :**
- (A) long-term average weather and its statistical variation for a given region
(B) weather averaged over a year
(C) measure of variations in the amount of precipitation
(D) measure of variations in the amount of temperature
- 32. Greenhouse effect refers to ability of :**
- (A) atmosphere to retain water vapor
(B) certain atmospheric gases to trap heat and keep the planet relatively warm
(C) cloud to scatter electromagnetic radiation
(D) cloud to retain water vapors
- 33. Depressions are _____.**
- (A) areas of low pressure (B) local winds
(C) seasonal winds (D) areas of high pressure
- 34. Besides landforms and drainage, which is the third basic element of the natural environment ?**
- (A) Temperature (B) Wind
(C) Rainfall (D) Climate
- 35. Why do coastal areas experience less contrast in temperature conditions ?**
- (A) Due to moderating effect of the seas (B) Due to land mass
(C) Due to heat conditions (D) Due to none of the above three
- 36. Oceanography is considered an interdisciplinary science because :**
- (A) the early explorers had broader educational backgrounds than the current scientists.
(B) to understand oceanography requires understanding of complex interactions among the biological, chemical, physical, geological, and atmospheric elements of the ocean realm.
(C) funding for oceanographic research is provided by many different nations each of which have different ideas about the discipline.
(D) It is not actually interdisciplinary.

37. **Waves are mostly caused by :**
- (A) Motion (B) Winds
(C) Storms (D) Shoreline
38. _____ **moves up and down in a circular motion.**
- (A) Oceans (B) Tides
(C) Waves (D) Currents
39. _____ **are flowing streams of water that move continually through the ocean in a specific direction.**
- (A) Tides (B) Currents
(C) Waves (D) Winds
40. _____ **are caused by the moon's gravitational pull on earth.**
- (A) Tides (B) Waves
(C) Currents (D) Winds
41. _____ **flow like rivers in different directions.**
- (A) Waves (B) Tides
(C) Oceans (D) Currents
42. _____ **are caused by the Earth's rotation, wind, or differences in temperature and salinity.**
- (A) Currents (B) Tides
(C) Oceans (D) Waves
43. **The first world atlas was produced by :**
- (A) Aristotle (B) Ptolemy
(C) Eratosthenes (D) Seneca
44. **The term 'nominal data' refers to :**
- (A) quantitative grouping of data (B) qualitative grouping of data
(C) ranking of data (D) variables with only two options
45. **What does 1mm on a map drawn at a scale of 1:50,000 represent on the ground ?**
- (A) 5 metres (B) 50 centimetres
(C) 500 centimetres (D) 50 metres

- 46. How is a large city most likely to be represented on a 1:25,000 scale map ?**
- (A) As a single point (B) As a line
(C) As an area (D) As a collection of points, lines and areas
- 47. Flow lines are one of the most useful symbols used on maps but there are limitations to what they can show. Which of the following could flow lines NOT show ?**
- (A) Direction of movement (B) Destination of movement
(C) Volume of movement (D) Reason for movement
- 48. The map type best used to record not only the presence of a phenomenon but to suggest its spatial pattern, distribution, or dispersion is :**
- (A) Dot (B) Choropleth
(C) Isoline (D) Statistical
- 49. What is the time difference between longitudes ?**
- (A) 5 minutes (B) 5 minutes 20 seconds
(C) 4 minutes (D) 4 minutes 20 seconds
- 50. How many kilometers are represented by 1 degree of latitude ?**
- (A) 191 KM (B) 161 KM
(C) 141 KM (D) 111 KM
- 51. A map projection that is made when contents of globe are moved onto a cone is :**
- (A) Cylindrical projection (B) Conic projection
(C) Azimuthal projection (D) Equal-Area projection
- 52. Common shapes of map projections are :**
- (A) Cone and planes (B) Cylinders and cones
(C) Cylinder and planes (D) Cylinder, cones and planes
- 53. A map projection that is made when contents of globe are moved onto a cylinder of paper is called :**
- (A) Cylindrical projection (B) Conic projection
(C) Azimuthal projection (D) Equal-Area projection

- 54. A map projection that shows an area between latitude and longitude equal in size to area on globe is known as :**
- (A) Cylindrical projection (B) Conic projection
(C) Azimuthal projection (D) Equal-Area projection
- 55. Most common map projections are based on :**
- (A) Two shapes (B) Three shapes
(C) Four shapes (D) Five shapes
- 56. Which one of the following is a point symbol ?**
- (A) Isopleths (B) Graduated circle
(C) Hachures (D) Contours
- 57. The average frequency and direction at a place can be shown by a star- diagram also known as :**
- (A) Wind roses (B) Climatographs
(C) Hythergraph (D) Ergograph
- 58. Which one of the following is a large scale map ?**
- (A) Wall map of the world (B) Political map of the world in an Atlas
(C) Topographical map (D) Atlas map of India
- 59. Isarithms which connect points of same elevation :**
- (A) Hachures (B) Isobars
(C) Contours (D) Isohyet
- 60. The distance between the North and South Poles is :**
- (A) 0 degree (B) 90 degrees
(C) 180 degrees (D) 360 degrees
- 61. _____ is the study of atmospheric phenomena.**
- (A) Weather (B) Climate
(C) Climatology (D) Meteorology

- 62. Approximately _____ % of the surface area of the earth is below sea level.**
- (A) 30 (B) 50
(C) 70 (D) 90
- 63. A line representing points of equal temperature :**
- (A) Isohel (B) Isohume
(C) Isoneph (D) Isotherm
- 64. What does GIS mean ?**
- (A) Global Information System (B) Geographic Information System
(C) Geological Information System (D) Geopolitical Information System
- 65. An automated system for the capture, storage, retrieval, analysis, and display of spatial data is known as :**
- (A) GPS (B) Remote sensing
(C) GIS (D) Photogrammetry
- 66. A diagram consisting of a series of bars, each bar shows the total value as well as the values of the components of the total value is known as :**
- (A) Simple bar diagram (B) Comparative or multiple bar diagram
(C) Compound or sub-divided bar diagram (D) Wind roses
- 67. Natural Remote Sensing is not done by :**
- (A) Eyes (B) Ears
(C) Nose (D) Tongue
- 68. Choropleth is :**
- (A) Line symbol (B) Point symbol
(C) Area symbol (D) Line graph
- 69. Who coined the term 'Remote Sensing' ?**
- (A) Evelyn Pruitt (B) Wright Brothers
(C) George Joseph (D) John R. Jensen



- 70. The process of transferring files from Internet to your computer is called :**
- (A) Downloading (B) FTP
(C) Forwarding (D) Uploading
- 71. How many generations of computers do we have ?**
- (A) 6 (B) 7
(C) 5 (D) 4
- 72. One of the Input devices in computer is :**
- (A) Keyboard (B) RAM
(C) Pen drive (D) Cable
- 73. What does the abbreviation GPS stand for ?**
- (A) Geographical Point Software (B) Global Positioning System
(C) Global Point Selection (D) Geographical Position System
- 74. What is the name of the Russian equivalent of GPS ?**
- (A) GLASNOST (B) GPESKI
(C) GLONASS (D) IKONOS
- 75. How many satellites are used in the US NAVSTAR GPS satellite constellation ?**
- (A) 16 (B) 24
(C) 20 (D) 30



ROUGH WORK

CET(PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : Masters of Social Work

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
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Masters of Social Work/A

1. Which service provides health education, feeding, nutrition, referral services, non-formal education ?
(A) ICDS (B) ICMR
(C) MCH (D) CGHS
2. Economic Justice as one of the objectives of the Indian Constitution has been provided in the
(A) Fundamental Rights and Directive Principles
(B) Preamble and Directive Principles
(C) Preamble and Fundamental Rights
(D) Preamble and Fundamental Rights and Directive Principles
3. Which among the following is not an example of institution?
(A) Family (B) Marriage
(C) Kinship (D) Peer group
4. The demographic dividend in India refers to the phenomenon of
(A) Increasing proportion of aged persons (65+) in the population
(B) Imbalance between the life expectancy of men and women
(C) The decreasing infant mortality rate
(D) The fastest growing working population vis-a-vis dependent population
5. Which Article of the Constitution refers to the welfare activities of the people ?
(A) Article-16 (B) Article -14
(C) Article -18 (D) Article -15
6. The first country in the world to launch a nation wide family planning programme is
(A) China (B) Russia
(C) America (D) India
7. Apartheid refers to
(A) Social discrimination (B) Political discrimination
(C) Racial discrimination (D) Spatial discrimination
8. The Civil Society Organizations is called
(A) First sector (B) Second sector
(C) Third sector (D) Fourth sector
9. SOS villages were started by
(A) Hermann Gmeiner (B) R. N. Butler
(C) B. Phillipson (D) K. D. Gangrade
10. The Chief Minister of Uttarakhand is
(A) B. B. Khaunduri (B) Harish Rawat
(C) N.D. Tiwari (D) Nityanand Swami

- 11. Which one of the following States has the lowest sex ratio?**
- (A) Kerala (B) Orissa
(C) Assam (D) Haryana
- 12. Kailash Satyarthi won Nobel peace prize for his work on**
- (A) Environmental issues (B) Climate Change
(C) Child rights (D) Tribal welfare
- 13. In which State of India is the famous Khajuraho Temple ?**
- (A) Chattisgarh (B) Rajasthan
(C) Gujarat (D) Madhya Pradesh
- 14. According to Census, which is the most populous state of India ?**
- (A) Madhya Pradesh (B) Maharashtra
(C) Uttar Pradesh (D) Tamil Nadu
- 15. Which date is celebrated internationally as World Red Cross Day?**
- (A) May 8 (B) April 30
(C) May 15 (D) November 30
- 16. Who is the author of the book Ignited Minds ?**
- (A) Dr. S. Radhakrishnan (B) Dr. A.P.J. Abdul Kalam
(C) Dr. Rajendra Prasad (D) Jawaharlal Nehru
- 17. Human Rights Day falls on**
- (A) 24 February (B) 10 December
(C) 15 May (D) 21 July
- 18. Who is Malala Yousufzai?**
- (A) First Muslim woman Booker prize winner (B) Norway's first Islamic Cabinet minister
(C) First Muslim woman to scale Mt.Everest (D) Pakistani teenage Education rights Activist
- 19. Medha Patkar is associated with the**
- (A) Tehri project (B) Enron project
(C) Sardar Sarovar project (D) Dabhol project
- 20. The Human Rights Council meets at**
- (A) Vienna (B) New York
(C) Geneva (D) Paris
- 21. Which South Asian Country has adopted Gross National Happiness as an index of well being of its citizen?**
- (A) Bangladesh (B) Bhutan
(C) Sri Lanka (D) Myanmar

- 22. Which agency is responsible for the estimation of poverty in India ?**
- (A) Planning Commission (B) Rural Development Ministry
(C) Ministry of Food and Civil Supplies (D) Finance Commission
- 23. Mahila Samakhya is a programme which focuses on**
- (A) Women education (B) Issues of adolescent Children
(C) Women empowerment (D) Health issues of rural women
- 24. Which of the following is not an 'inclusion criteria' for BPL survey of urban areas ?**
- (A) Place of residence (B) Type of Roof
(C) Social vulnerability (D) Occupational Vulnerability
- 25. Permanent Settlement was a feature of**
- (A) Zamindari System (B) Mahalwari System
(C) Ryotwari System (D) None of the above
- 26. When was National Development Council established ?**
- (A) 1956 (B) 1952
(C) 1957 (D) 1958
- 27. Which one of the following States was first to introduce Panchayati Raj System in India ?**
- (A) Tamil Nadu (B) West Bengal
(C) Rajasthan (D) Uttar Pradesh
- 28. The National Commission on Scheduled Castes is a**
- (A) Statutory Body (B) Constitutional body
(C) Body created by the decision of the Cabinet (D) Extra Constitutional body
- 29. A present group of nations known as G-8 started first as G-7. Which one among the following was not one of them?**
- (A) Canada (B) Italy
(C) Japan (D) Russia
- 30. Among the following, who are the Agaria community?**
- (A) A traditional toddy tappers community
(B) A traditional fishing community of Maharashtra
(C) A traditional silk-weaving community of Karnataka
(D) A traditional salt pan workers community of Gujarat
- 31. Taoism is a school of**
- (A) Chinese philosophy (B) Japanese philosophy
(C) Buddhist philosophy (D) Sri Lankan philosophy

- 32. What is mixed farming ?**
(A) Growing of several crops in a planned way
(B) Growing Rabi as well as Kharif crops
(C) Growing several crops and also rearing animals
(D) Growing of fruits as well as vegetables
- 33. Which of the countries represent letter 'C' in the category known as BRIC countries ?**
(A) Canada (B) Chile
(C) Cuba (D) China
- 34. Which of the following is not included in the 'eight-fold path' of Buddhism ?**
(A) Right Speech (B) Right Contemplation
(C) Right Desire (D) Right Conduct
- 35. During India's freedom struggle, the 'Sepoy Mutiny' started from which of the following places ?**
(A) Agra (B) Gwalior
(C) Jhansi (D) Meerut
- 36. Who founded the Brahma Samaj ?**
(A) Debendranath Tagore (B) Keshab Chandra Sen
(C) Raja Ram Mohan Roy (D) Ishwar Chandra Vidyasagar
- 37. In which State of India you would find Khajuraho ?**
(A) Uttar Pradesh (B) Orissa
(C) Karnataka (D) Madhya Pradesh
- 38. 'Cause and effect' in social science means**
(A) A relationship in which change in one variable causes change in another
(B) Explains the relationship between two attributes
(C) A bipolar theory
(D) Explains causes between two concepts
- 39. Which date is observed as World Social Justice Day ?**
(A) 20 February (B) 28 February
(C) 1 January (D) 25 December
- 40. The word 'Economics' is taken from which language ?**
(A) German (B) English
(C) French (D) Greek
- 41. Kandla port is located at**
(A) Gulf of Khambat (B) Gulf of Kutch
(C) Kori Creek (D) None of the above

- 42. Which is the largest man-made lake ?**
(A) Gobind Sagar (B) Rana Pratap Sagar
(C) Baikal (D) Dhebar
- 43. The 'Pradhan Mantri Jan Dhan Yojana' launched by the Government of India is a**
(A) Tribal Welfare Programme (B) Financial Literacy Programme
(C) Infrastructure Development Programme (D) Financial Inclusion Programme
- 44. What is Bio-diversity ?**
(A) Many types of flora & fauna in one forest (B) Many types of flora and fauna in many forests
(C) Many populations of one species in one forest (D) All of the above
- 45. Who is known as the father of Operation Flood ?**
(A) Dr. Norman Borlaug (B) Dr. M.S. Swaminathan
(C) Dr. Verghese Kurien (D) Dr. William Gande
- 46. The data of estimation of India's National income is issued by**
(A) Planning Commission (B) National Data Center
(C) Central Statistical Organisation (D) None of above
- 47. Which five year plan focused on "Growth with social justice and equity" ?**
(A) Ninth Five Year Plan (B) Eighth Five Year Plan
(C) Seventh Five Year Plan (D) Sixth Five Year Plan
- 48. When community development programme (CDP) started ?**
(A) 1952 (B) 1953
(C) 1954 (D) 1955
- 49. For the first time Indian Legislature was made "Bi-cameral" under :**
(A) Government of India Act, 1861 (B) Government of India Act, 1892
(C) Government of India Act, 1915 (D) Government of India Act, 1919
- 50. Punjab was divided into Punjab and Haryana in the year**
(A) 1966 (B) 1967
(C) 1968 (D) 1969
- 51. The state of Chhattisgarh came into existence on**
(A) 1st November, 2000 (B) 1st November, 2001
(C) 1st November, 2002 (D) 1st November, 2003
- 52. "Jatakas" are sacred text associated with :**
(A) Hinduism (B) Jainism
(C) Buddhism (D) Jews

- 53. Which country has recently signed refugee deal with European Union?**
 (A) Iran (B) Turkey
 (C) Russia (D) Saudi Arabia
- 54. What is the theme of the 2016 World Water Day (WWD)?**
 (A) The World's Water: Is there enough (B) Water and Culture
 (C) Better Water, Better Jobs (D) Clean Water and War
- 55. Recently, which State government has developed a mobile app to monitor the Mahatma Gandhi National Rural Employment Guarantee Scheme?**
 (A) Bihar (B) Telangana
 (C) Uttar Pradesh (D) Karnataka
- 56. Which two States of India are undergoing controversies over Satluj-Yamuna canal link?**
 (A) Haryana and Rajasthan (B) Punjab and Haryana
 (C) Uttarakhand and Uttar Pradesh (D) Jammu & Kashmir and Punjab
- 57. Among the major Indian States, the most urbanized state is**
 (A) Maharashtra (B) Kerala
 (C) Tamil Nadu (D) Himachal Pradesh
- 58. Who was the ruler of India when the East India Company was set up?**
 (A) Jehangir (B) Aurangzeb
 (C) Akbar (D) Humayun
- 59. Champaran Satyagraha led by Gandhiji aimed at**
 (A) Securing the rights of the Harijan (B) Establishing Hindu Muslim Unity
 (C) Against imposition of salt tax (D) Solving problems of Indigo cultivators
- 60. When did Muslim League adopt self government as one of its objectives ?**
 (A) 1919 (B) 1911
 (C) 1912 (D) 1920
- 61. Which State has the lowest area under forest ?**
 (A) Gujarat (B) Uttarakhand
 (C) Andhra Pradesh (D) Haryana
- 62. Which of the following tribes practices pastoral nomadism ?**
 (A) Eskimo (B) Boro
 (C) Pygmy (D) Masai
- 63. The Election Commission is responsible for the conduct of elections to**
 (A) The Parliament (B) State Legislature
 (C) Office of the President and Vice President (D) All of the above

- 64. In India, the money bill is certified by**
- (A) Prime Minister (B) Finance Minister
(C) Speaker (D) President
- 65. The amendment procedure of the Indian Constitution has been modeled on the constitutional pattern of**
- (A) South Africa (B) Canada
(C) USA (D) Switzerland
- 66. National Agricultural Policy 2000 emphasises the following as a measure of land reform**
- (A) Tenancy reform (B) Cooperative farming
(C) Distribution of surplus land (D) Consolidation of holdings
- 67. Narmada Bachao Andolan is associated with which activist ?**
- (A) Medha Patkar (B) Irom Sharmila
(C) Sundarlal Bahuguna (D) Rajendra Singh
- 68. Sex-ratio means**
- (A) The relation between male and female
(B) The ratio between the number of adult males and adult females in a population
(C) The ratio between number of females and number of males in a population
(D) The number of females per 1000 males in a population
- 69. 'Chipko' movement is associated with**
- (A) Human rights (B) Women welfare
(C) Religious activists (D) Environmental conservation
- 70. Sarva Shiksha Abhiyan (SSA) was launched in the IXth Five Year Plan to**
- (A) Bridge all the gender and social gaps in education
(B) Universalisation of Elementary Education
(C) Education for all
(D). Education for the weaker sections
- 71. Right to Information Act was enacted from**
- (A) 2000 (B) 2005
(C) 2002 (D) 1999
- 72. Human Development Index is a composite of**
- (A) Income, trade and investment indicators
(B) Poverty, human rights and unemployment indicators
(C) Income, health and education indicators
(D) Health, education and quality of life indicators

73. Article 359 of the Constitution authorizes the President of India to suspend the right to move any court for the enforcement of Fundamental Rights during

- (A) A National Emergency
- (B) A failure of Constitutional machinery in States
- (C) A financial emergency
- (D) None of the Above

74. The Mid Day Meal scheme is a

- (A) Rural nutrition programme
- (B) Tribal area programme
- (C) School meal programme
- (D) None of the above

75. Badrinath is situated on the bank of river

- (A) Ganga
- (B) Yamuna
- (C) Alaknanda
- (D) Saraswati

ROUGH WORK

ROUGH WORK

CET(PG)-2016

Question Booklet Series : A

Sr. No. :

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : Mathematics

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
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1. If * is a commutative composition in a set S, and if a, b, c ∈ S, then :
- (A) $a * (b * c) = (c * b) * a$ (B) $a * (b * c) = (a * b) * c$
 (C) $a * (b * c) = (a * c) * b$ (D) $a * (b * c) = b * (c * a)$
2. A relation R is defined from {2, 3, 4, 5} to {3, 6, 7, 10} by xRy iff x is relatively prime to y, then domain of R is :
- (A) {2, 3, 5} (B) {3, 5}
 (C) {2, 3, 4} (D) {2, 3, 4, 5}
3. If a_1, a_2, \dots, a_n are roots of the equation $P(x) = x^n + a_1x^{n-1} + \dots + a_n = 0$, where $a_i, i = 1, 2, \dots, n$ are real numbers. The value of $(1 + a_1^2)(1 + a_2^2) \dots (1 + a_n^2)$ is :
- (A) $(1 - a_2 + a_4 - \dots)^2 + (a_1 - a_3 + a_5 - \dots)^2$
 (B) $(a_2 - a_4 + a_6 - \dots)^2 + (1 - a_1 + a_3 - \dots)^2$
 (C) $(1 + a_2 + a_4 + \dots)^2 + (a_1 + a_3 + \dots)^2$
 (D) $(a_2 + a_4 + \dots)^2 + (1 + a_3 + a_5 + \dots)^2$
4. If each root of the equation $y^4 - 22y^3 + 130y^2 - 243y + 61 = 0$ is greater by p than each root of the equation $x^4 - 6x^3 - 38x^2 - 3x + 17 = 0$, then the value of p is :
- (A) 16 (B) 8
 (C) -4 (D) 4
5. The number of real roots of the equation $z^5 + 3iz - 1 = 0$ is :
- (A) 0 (B) 1
 (C) 3 (D) 4
6. The sum of roots of the equation $((x + 3)^2 + 9)((x - 2)^2 + 4) = 0$ is :
- (A) -9 (B) -6
 (C) -2 (D) 0
7. If n is positive integer then $(1 + i\sqrt{3})^n + (1 - i\sqrt{3})^n$ is equal to :
- (A) $2^n \sin \frac{2n\pi}{3}$ (B) $2^n \sin \frac{n\pi}{3}$
 (C) $2^{n+1} \cos \frac{n\pi}{3}$ (D) $2^{n+1} \sin \frac{n\pi}{3}$

8. The four values of $\left(\frac{1}{2} + \frac{1}{2}\sqrt{-3}\right)^{3/4}$ are :

(A) $\pm \frac{1}{2}(1 \pm i)$

(B) $\pm \frac{1}{\sqrt{2}} \pm i$

(C) $\pm \frac{1}{\sqrt{2}}(1 \pm i)$

(D) $\pm 1 \pm i\sqrt{3}$

9. If p_n is the n^{th} prime number then

$\lim_{n \rightarrow \infty} (-1)^{p_n+1} \sqrt{\left(1 + \frac{1}{p_n}\right)}$ is :

(A) 0

(B) 1

(C) -1

(D) Does not exist

10. $\lim_{x \rightarrow -\infty} \left(\sqrt{x^2 + 2x + x}\right)$ is :

(A) -1

(B) 0

(C) 1

(D) Does not exist

11. $\int_0^{\pi/2} \frac{7 \tan x - 3 \cot x}{\tan x + \cot x} dx$ is equal to :

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{2}$

(C) π

(D) 2π

12. $\lim_{n \rightarrow \infty} \left(\left(1 + \frac{1}{n^2}\right) \left(1 + \frac{2^2}{n^2}\right) \dots \left(1 + \frac{n^2}{n^2}\right) \right)^{1/n}$ is equal to :

(A) $e^{\frac{\pi-4}{2}}$

(B) $2e^{\frac{\pi-4}{2}}$

(C) $\frac{1}{2}e^{\frac{\pi-4}{2}}$

(D) $4e^{\frac{\pi-4}{2}}$

13. Order and degree respectively of the differential equation $\frac{d^2}{dx^2} \left(\left(\frac{d^2 y}{dx^2} \right)^{-3/2} \right) = 0$ are :

(A) 1, 4

(B) 4, 1

(C) 4, 4

(D) 1, 1

14. For the non-exact differential equation $(1 + xy)y dx + (1 - xy)x dy = 0$ the integrating factor is :

(A) $\frac{1}{2x^2y^2}$

(B) $\frac{1}{2xy}$

(C) $\frac{1}{2xy^2}$

(D) $\frac{1}{2x^2y}$

15. The solution of the differential equation $y'' + 2y' + 2y = 0$ with initial conditions $y(0) = 0, y'(0) = 1$ is :

(A) $y = e^{-x} \cos x$

(B) $y = e^{-x} \sin x$

(C) $y = (\cos x + \sin x)e^{-x}$

(D) $y = \sin x$

16. If the pair of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then :

(A) $p + q = 0$

(B) $pq = -1$

(C) $p^2 + q^2 = 1$

(D) $\frac{1}{p} + \frac{1}{q} = 1$

17. Centre of the conic $x^2 + 24xy - 6y^2 + 28x + 36y + 16 = 0$ is

(A) $(0, 0)$

(B) $(1, 1)$

(C) $(-1, -2)$

(D) $(-2, -1)$

18. If e and e' are the eccentricities of two conjugate hyperbolas then :

(A) $e^2 + e'^2 = 1$

(B) $e^2 + e'^2 = 2$

(C) $e^{-2} + (e')^{-2} = 1$

(D) $e^{-2} + (e')^{-2} = \frac{1}{2}$

19. If the length of the radical axis of two circles $x^2 + y^2 + 8x + 1 = 0$ and $x^2 + y^2 + 2my - 1 = 0$ is $2\sqrt{6}$. Then the values of m are :

(A) ± 4

(B) ± 8

(C) ± 3

(D) ± 6

20. The equation $x^2 + xy + y^2 + 2x + 3 = 0$ represents an :

(A) Ellipse

(B) Pair of straight lines

(C) Hyperbola

(D) Parabola

21. Let A be a 3×3 matrix of determinant 5. If $B = 4A^2$ then the determinant of B is :

(A) 20

(B) 100

(C) 320

(D) 1600

22. The polar equation $r = \frac{2}{4 \cos \theta + 5 \sin \theta}$ represents :
- (A) a straight line (B) a parabola
(C) a hyperbola (D) an ellipse
23. The point of intersection of the lines $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}$ and $\vec{r} \times \vec{b} = \vec{a} \times \vec{b}$ is :
- (A) $\vec{a} - \vec{b}$ (B) $\vec{a} + \vec{b}$
(C) $\vec{b} - \vec{a}$ (D) $-\vec{b} - \vec{a}$
24. If $\vec{a}, \vec{b}, \vec{c}$ are non-zero vectors such that $(\vec{a} \times \vec{b}) \times \vec{c} = \vec{a} \times (\vec{b} \times \vec{c})$ then which one of the following is correct ?
- (A) \vec{a} and \vec{b} are collinear (B) \vec{a} and \vec{c} are collinear
(C) \vec{b} and \vec{c} are collinear (D) None of the above
25. $\sum u_n$ is a series of positive terms ; then :
- (A) Convergence of $\sum (-1)^n u_n$ implies convergence of $\sum u_n$
(B) Convergence of $\sum u_n$ implies convergence of $\sum (-1)^x u_n$
(C) Convergence of $\sum (-1)^n u_n$ implies divergence of $\sum u_n$
(D) Divergence of $\sum u_n$ implies divergence of $\sum (-1)^n u_n$
26. Asymptote of the curve $x^3 + y^3 - 3axy = 0$ is :
- (A) $x + y + a = 0$ (B) $x + y - a = 0$
(C) $x + a = 0$ (D) $y + a = 0$
27. For the given sequence $\left\{(-1)^n \left(1 + \frac{1}{n}\right)\right\}$ which one of the following statements is correct ?
- (A) Limit superior = limit inferior
(B) Neither limit superior nor limit inferior exist
(C) Limit superior is 1 and limit inferior is -1
(D) Limit superior is 1 and limit inferior is 0
28. Let $\sum u_n$ and $\sum v_n$ be two series of positive terms such that $\lim_{n \rightarrow \infty} \frac{u_n}{v_n} = K$ (a non-zero real number) then :
- (A) $\sum u_n$ converges and $\sum v_n$ diverges
(B) $\sum v_n$ converges and $\sum u_n$ diverges
(C) Both $\sum u_n$ and $\sum v_n$ converge or diverge together
(D) $\sum u_n v_n$ converges

29. The interval of convergence of the series

$$\frac{1}{1.2.3} + \frac{x^2}{2.3.4} + \frac{x^4}{3.4.5} + \frac{x^6}{4.5.6} + \dots \text{ is :}$$

- (A) $1 \leq x \leq 3$ (B) $-1 \leq x \leq 1$
 (C) $0 \leq x \leq 5$ (D) $-2 \leq x \leq 2$

30. The function $f(x) = \begin{cases} x & \text{when } 0 < x < \frac{1}{2} \\ 1 & \text{when } x = \frac{1}{2} \\ 1 - x & \text{when } \frac{1}{2} < x < 1 \end{cases}$

is :

- (A) Continuous for all values of x in $(0, 1)$
 (B) Is discontinuous at all values of x
 (C) Is discontinuous at $0, \frac{1}{2}$ and 1
 (D) Is discontinuous at $\frac{1}{2}$ only

31. If $f(x)$ is continuous in the closed interval $[0, 1]$ and differentiable in the open interval $(0, 1)$ then for same a $\hat{I} (0, 1)$:

- (A) $f(a) = 0$ (B) $f'(a) = 0$
 (C) $f'(a) = f(1) - f(0)$ (D) $f'(a) = f(1) + f(0)$

32. If f is 1 - 1 and continuous with domain A and range B , then :

- (A) f^{-1} exists and continuous on B and one to one
 (B) f^{-1} does not exist
 (C) f^{-1} exists but is discontinuous on B
 (D) f^{-1} exists and is continuous but not one to one

33. Let $f(x, y) = \begin{cases} \frac{2xy^2}{x^2 + y^6}, & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$

$$g(x, y) = \begin{cases} \frac{2xy}{\sqrt{x^2 + y^2}}, & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$$

then :

- (A) $f(x, y)$ and $g(x, y)$ are both continuous at $(0, 0)$
 (B) $f(x, y)$ is continuous at $(0, 0)$ but $g(x, y)$ is discontinuous at $(0, 0)$
 (C) $f(x, y)$ is discontinuous at $(0, 0)$ but $g(x, y)$ is continuous at $(0, 0)$
 (D) None of $f(x, y)$ and $g(x, y)$ is continuous at $(0, 0)$

34. If $f(x, y) = \left(\sqrt{x^2 + y^2}, \tan^{-1} \frac{y}{x}\right)$, then for $(x, y) \neq (0, 0)$ Jacobian of f , $J_f(x, y)$ at $(x, y) = (1, 2)$ is :

- (A) $\frac{1}{\sqrt{5}}$ (B) $\frac{2}{\sqrt{5}}$
 (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$

35. If $u = \tan^{-1} \left(\frac{x^3 + y^3}{x - y}\right)$, $x \neq y$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is :

- (A) $\tan 2u$ (B) $\sin 2u$
 (C) $\cos 2u$ (D) $\sec^2 u$

36. Envelope of the system of circles $(x - a)^2 + y^2 = 4a$, a being parameter is :

- (A) $x^2 - 4y - 4 = 0$ (B) $x^2 + 4y - 4 = 0$
 (C) $y^2 - 4x - 4 = 0$ (D) $y^2 + 4x - 4 = 0$

37. If $P_n(x)$ denotes n^{th} Legendre polynomial then which of the following relations is true ?

- (A) $P'_n(x) - x P_n(x) = n P_n(x)$ (B) $P'_n(x) - (x + 1) P'_{n-1}(x) = n P_n(x)$
 (C) $x P'_n(x) + P'_{n-1}(x) = n P_n(x)$ (D) $x P'_n(x) - P'_{n-1}(x) = n P_n(x)$

38. Fourier series expansion of the function $f(x) = x^3 - x$, $0 \leq x \leq \pi$ contains :

- (A) Only sine series
 (B) Only cosine series
 (C) Both sine as well as cosine series
 (D) Depends on the way we define $f(x)$ on $(-\pi, 0)$

39. Laplace transform of $\frac{3}{s^2 + 2s}$ is :

- (A) $3(1 - e^{-2t})$ (B) $\frac{3}{2}(1 - e^{-2t})$
 (C) $3 - e^{-2t}$ (D) $\frac{3}{2}(1 + e^{-2t})$

40. The first order linear partial equation of the form $Pp + Qq = R$ has a subsidiary

equation, $p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$:

- (A) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (B) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{R}$
 (C) $\frac{1}{p} = \frac{1}{q} = \frac{1}{R}$ (D) $\frac{1}{P} = \frac{1}{Q} = \frac{1}{R}$

41. The Bernoulli differential equation is given by :

(A) $\frac{dy}{dx} + P(x)y = Q(x)y^n$

(B) $\frac{dy}{dx} + y = Q(x)y^2 + R(x)$

(C) $\frac{dy}{dx} + P(x)y = Q(x)(1 + y^2)$

(D) $\frac{dy}{dx} + P(y)x = Q(y)x^n$

42. If $z = f(z + ay) + g(x - ay)$, then $\frac{\partial^2 z}{\partial x^2}$ is equal to :

(A) $\frac{1}{\alpha} \frac{\partial^2 z}{\partial y^2}$

(B) $\frac{1}{\alpha^2} \frac{\partial^2 z}{\partial y^2}$

(C) $\alpha \frac{\partial^2 z}{\partial y^2}$

(D) $\alpha^2 \frac{\partial^2 z}{\partial y^2}$

43. The value of the integral $\int_1^2 \int_0^x \frac{dy dt}{t^2 + y^2}$ is equal to :

(A) 12

(B) $\log 2$

(C) $\frac{\pi}{4} \log 2$

(D) $\pi \log 2$

44. The necessary and sufficient condition for a vector $\vec{f}(t)$ to have constant direction is :

(A) $\frac{d\vec{f}}{dt} = 0$

(B) $\vec{f} \cdot \frac{d\vec{f}}{dt} = 0$

(C) $\vec{f} \times \frac{d\vec{f}}{dt} = 0$

(D) $\frac{d^2\vec{f}}{dt^2} = 0$

45. Value of $\iint_S (4xy \hat{i} + 2y \hat{j} - xz \hat{k}) \cdot \hat{n} ds$, where S is the surface of a cube bounded by $x = 0$,

$x = 2, y = 0, y = 2, z = 0, z = 2$ is :

(A) 64

(B) 32

(C) 24

(D) 8

46. A point P describes, with a constant angular velocity about O, the curve $r = ae^{\theta}$, O being the pole of the curve. The transverse acceleration of P is :

(A) $2\omega r$

(B) $2\omega^2 r$

(C) $2\omega r^2$

(D) 0

47. The value of constant 'a', so that the vector $\vec{F} = (x + 3y)\hat{i} + (y - 2z)\hat{j} + (x + az)\hat{k}$ is solenoidal is :

- (A) -2 (B) 0
(C) 2 (D) 4

48. The maximum velocity of a body moving with SHM is 2 ft/sec and its period is $\frac{1}{5}$ seconds. The amplitude of motion is :

- (A) $\frac{1}{\pi}$ (B) $\frac{\pi}{5}$
(C) $\frac{1}{10\pi}$ (D) $\frac{1}{5\pi}$

49. A particle describes the curve $r^2 = a^2 \cos 2\theta$ under a force directed towards the pole; then the force is proportional to :

- (A) $\frac{1}{r^2}$ (B) $\frac{1}{r^3}$
(C) $\frac{1}{r^4}$ (D) $\frac{1}{r^7}$

50. Three coplanar forces each of magnitude 10 N act on a particle. If their lines of action subtend equal angles with each other then the resultant of these forces is :

- (A) 0 (B) 10 N
(C) $10\sqrt{3}$ N (D) 30 N

51. A particle describes a plane curve with a constant speed and its acceleration is constant in magnitude. Then the path of the particle is :

- (A) An ellipse (B) A straight line
(C) A circle (D) A parabola

52. Consider the following two statements :

- (1) If $|f|$ is Riemann integrable on an interval $[a, b]$ then so is f
(2) If f is discontinuous function in $[a, b]$ then f is not Riemann integrable

- (A) (1) and (2) both true (B) (1) true (2) false
(C) (1) false (2) true (D) (1) and (2) both false

53. Value of $\sin \left(\left(G\left(\frac{3}{2}\right) \right)^2 \right) + \cos \left(\left(G\left(\frac{3}{2}\right) \right)^2 \right)$ is:

- (A) 1 (B) $\frac{1}{2}$
(C) $\sqrt{2}$ (D) $2\sqrt{2}$

54. Consider the improper integrals

(1) $\int_1^2 \frac{\sqrt{x}}{\log x} dx$ (2) $\int_1^2 \frac{1}{x \log x} dx$ then :

- (A) Both (1) and (2) diverge (B) Both (1) and (2) converge
(C) (1) converges but (2) diverges (D) (1) diverges but (2) converges

55. If $\langle s \rangle$ and $\langle t \rangle$ are cyclic subgroups of S_4 , the symmetric group of four letters generated

by $s = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{pmatrix}$ and $t = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 2 & 1 \end{pmatrix}$ respectively, then $\langle s \rangle \cap \langle t \rangle$ is a subgroup of order :

- (A) 0 (B) 1
(C) 2 (D) 4

56. Which one of the following statements is not correct ?

- (A) Set of rational numbers is a field
(B) \mathbb{Z}_{31} the ring of integers modulo 31 is a field
(C) $\mathbb{R}[x]$ the set of polynomials over set of real numbers is an integral domain
(D) $\mathbb{Q}[x]$ set of polynomials over rational numbers is a field

57. If A and B are both sets having n elements then number of onto functions from A to B is :

- (A) n^n (B) $n!$
(C) $n^n - n!$ (D) None of the above

58. In which of the following cases * is a binary operation on S ?

- (A) $S = \{1, 2, 3, 6, 18\}$ $a * b = ab$
(B) $S = \{1, -2, 3, 2, -4\}$ $a * b = |b|$
(C) $S = \mathbb{Z}$ the set of integers $a * b = a + b^2$
(D) $S = \mathbb{N}$ the set of natural numbers $a * b = a - b$

59. Which one of the following groups is cyclic ?

- (A) $\mathbb{Z}_{12} \times \mathbb{Z}_{21}$ (B) $\mathbb{Z}_{10} \times \mathbb{Z}_{45}$
(C) $\mathbb{Z}_4 \times \mathbb{Z}_{25} \times \mathbb{Z}_6$ (D) $\mathbb{Z}_{22} \times \mathbb{Z}_{15} \times \mathbb{Z}_{91}$

60. If every element of a group G is its inverse then G has to be :

- (A) finite (B) infinite
(C) cyclic (D) abelian

61. If two eigen values of the matrix

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$

are 5 and -1 , then the third is :

- (A) 5 (B) -1
(C) 1 (D) 2

62. The system of equations

$$x + 2y + 3z = 0$$

$$3x + 4y + 4z = 0$$

$$7x + 10y + 12z = 0$$

- (A) possesses the trivial solution only
(B) possesses a unique non-zero solution
(C) does not have a common solution
(D) has infinitely many solutions

63. A square matrix A is such that $A^* = -A$, where A^* denotes transpose of the conjugate of A . Then A is called :

- (A) Hermitian (B) Skew Hermitian
(C) Symmetric (D) Skew symmetric

64. A is any square matrix, then $A + A^T$, where A^T denotes the transpose of A is :

- (A) Skew-symmetric (B) Non-symmetric
(C) Symmetric (D) Null matrix

65. Which of the following vectors alongwith $(2, 4, 6)$ form a basis for the vector space \mathbb{R}^3 :

- (A) $(1, 0, 2), (0, 1, 3)$ (B) $(1, 2, 3), (0, 1, 3)$
(C) $(1, 3, 5), (2, 6, 10)$ (D) $(1, 3, 5), (3, 7, 11)$

66. The linear transformation $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ given by $T((x, y, z)) = (x + y + z, x + y, x)$ is :

- (A) One to one but not onto (B) Onto but not one to one
(C) One to one and onto (D) Neither one to one nor onto

72. The quadratic form $f(X) = X'AX = X'BX$, where A is symmetric matrix $X = (x, y, z)$ and

if $B = \begin{pmatrix} 10 & -2 & 4 \\ -4 & 1 & -1 \\ 2 & -1 & 1 \end{pmatrix}$ then the matrix A is :

(A) $\begin{pmatrix} 10 & -3 & 4 \\ -3 & 1 & 1 \\ 4 & 1 & 1 \end{pmatrix}$

(B) $\begin{pmatrix} 10 & -3 & 3 \\ -3 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 10 & -4 & 3 \\ -4 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} 10 & -3 & 2 \\ -3 & 1 & -1 \\ 2 & -1 & 1 \end{pmatrix}$

73. The singular solution of $y^2(1 + y'^2) = r^2$ where r is a constant is :

(A) $y^2 = 4ax$

(B) $y^2 = 4r$

(C) $y^2 = r^2$

(D) $y^2 = r^3$

74. \vec{P} and \vec{Q} are two forces acting at a point O at such an angle that their resultant \vec{R} has magnitude equal to \vec{P} . If magnitude of \vec{P} is doubled then the angle between the new resultant \vec{R}_1 and \vec{Q} is :

(A) 30°

(B) 45°

(C) 60°

(D) 90°

75. If a particle is at equilibrium when subjected to four forces $F_1 = 2\hat{i} - 5\hat{j} + 6\hat{k}$, $F_2 = \hat{i} + 3\hat{j} - 7\hat{k}$, $F_3 = 2\hat{i} - 2\hat{j} - 3\hat{k}$ and F_4 then F_4 is equal to :

(A) $-5\hat{i} + 4\hat{j} + 4\hat{k}$

(B) $5\hat{i} - 4\hat{j} - 4\hat{k}$

(C) $3\hat{i} - 2\hat{j} - \hat{k}$

(D) $3\hat{i} + \hat{j} - 10\hat{k}$

ROUGH WORK

ROUGH WORK

CET(PG)–2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : MBA For Executives

Time : 90 minutes

Number of Questions : 85

Maximum Marks : 85

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **85** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **Pakistan came into being in :**
(A) 1957 (B) 1947
(C) 1946 (D) 1958
2. **Barbarik was the :**
(A) Grandson of Karna (B) Grandson of Arjuna
(C) Grandson of Bhima (D) Grandson of Balram
3. **Umar Abdullah is one of the leaders of :**
(A) Indian National Congress (B) Bharatiya Janta Party
(C) Jammu & Kashmir National Conference (D) Bharatiya Lok Dal
4. **The famous Khajuraho Temples are situated in :**
(A) Madhya Pradesh (B) Chhattisgarh
(C) Gujarat (D) Uttar Pradesh
5. **Howrah Bridge is situated in :**
(A) Allahabad (B) New Delhi
(C) Hyderabad (D) Kolkatta
6. **The acronym NADA stands for :**
(A) National Anti Doping Agency (B) Natural Anti Doping Agent
(C) National Anti Drugging Agency (D) National Anti Dope Agent
7. **Rahul was the son of :**
(A) Ravidas (B) Chaitanya Mahaprabhu
(C) Mahatma Buddha (D) Mahavir
8. **The famous Pisa tower is situated in :**
(A) Australia (B) South Africa
(C) China (D) Italy
9. **The sixth Guru of Sikhs was :**
(A) Guru Angad Dev ji (B) Guru Arjun Dev ji
(C) Guru Har Govind ji (D) Guru Har Rai ji
10. **The third President of India was :**
(A) Rajender Prasad (B) Radhakrishnan
(C) Zaqir Hussain (D) Fakhruddin Ali Ahmad
11. **The Fourth Mogul Emperor in India was :**
(A) Shahjahan (B) Akbar
(C) Jahangir (D) Changez Khan

- 12. The acronym URL stands for :**
- (A) Uniform Resource Link (B) Uniform Resource Locator
(C) Uniform Registered Locator (D) Non-Uniform Resource Link
- 13. President of India is elected for a period of :**
- (A) 5 years (B) 6 years
(C) 4 years (D) None of the above
- 14. Which country was defeated by Afghanistan in a league match in the T-20 World Cricket Cup in 2016?**
- (A) England (B) West Indies
(C) Sri Lanka (D) Bangladesh
- 15. HTML stands for :**
- (A) Hyper Text Markup Language (B) Hyper Text Manipulation Language
(C) Hyper Text Management Language (D) Hyper Text Miniature Language
- 16. The acronym RTGS stands for :**
- (A) Reality Time Gross Settlement (B) Real Table Gross Settlement
(C) Real Test Gross Settlement (D) Real Time Gross Settlement
- 17. The statutory body regulating capital market in India is :**
- (A) SEBI (B) SEC
(C) SECI (D) RBI
- 18. Nagarjuna Sagar project is on the river :**
- (A) Krishna (B) Kaveri
(C) Taapti (D) Narmada
- 19. The sector of the economy of India contributing the highest share to the GDP is :**
- (A) Agriculture (B) Industry
(C) Service (D) Textiles
- 20. Which of the following functions cannot be performed by Reserve Bank of India ?**
- (A) Issue of currency notes (B) Acceptance of deposits from public
(C) Regulation of commercial banks (D) Acting as a banker to a State government
- 21. The acronym TAPI stands for :**
- (A) Turkmenistan Afghanistan Pakistan India (B) Tanzania Afghanistan Pakistan India
(C) Turkmenistan Austria Pakistan India (D) Turkmenistan Afghanistan Pakistan Iran
- 22. The oldest Stock Exchange in India is :**
- (A) Delhi Stock Exchange (B) Madras (Chennai) Stock Exchange
(C) Bombay (Mumbai) Stock Exchange (D) Calcutta (Kolkata) Stock Exchange

23. The acronym FIPB stands for :

- (A) Foreign Investment Promotion Board
- (B) Foreign Investment Promotion Bureau
- (C) Foreign Industrial Promotion Board
- (D) Foreign Industrial Promotion Bureau

24. Bank rate is the rate at which :

- (A) RBI makes funds available to commercial banks
- (B) SBI discount hundis of indigenious bankers
- (C) Shroffs discount bills of small traders
- (D) Commercial banks discount bills of exchange

25. Commercial paper is a :

- (A) Bill of exchange
- (B) Promissory note
- (C) Cheque
- (D) A long term financial instrument

26. Excise duty is a tax on :

- (A) Manufacture
- (B) Export
- (C) Imports
- (D) Consumption

27. Fiscal policy is concerned with :

- (A) Government revenue and expenditure
- (B) Regulation of money supply
- (C) Industrial development
- (D) Government borrowings

28. The acronym SIBOR stands for :

- (A) Singapore International Bank on Record
- (B) Singapore Investment Banks on Record
- (C) Singapore Inter Bank Offer Rate
- (D) Singapore Inter Bank Official Rate

29. ICRA is a :

- (A) Credit control agency
- (B) Credit rating agency
- (C) Investment promotion organization
- (D) Regional Rural Bank

Data interpretation and problem solving

The following table shows the income of a bank from various services during a particular year.

Study the table and answer the questions 30-36.

Item	%age of total income
Interest	45
Discounts	25
Commission	10
Exchange	6
Brokerage	9
Others	5

30. The ratio of income from interest to income from others is :

- (A) 9 : 1
- (B) 1 : 9
- (C) 8.5 : 1
- (D) 8 : 1

31. If the income from interest during the year was 90,000 lakhs, how much was income from discount ?
- (A) 30,000 lakhs (B) 25,000 lakhs
(C) 60,000 lakhs (D) 50,000 lakhs
32. According to the chart the highest contribution to the income of the bank comes from :
- (A) Interest and exchange (B) Discount and commission
(C) Brokerage and others (D) Commission and brokerage
33. If the income from brokerage was Rs. 18,000 then the income from exchange would have been
- (A) Rs. 12,000 (B) Rs. 22,000
(C) Rs. 16,000 (D) Rs. 20,000
34. Interest, brokerage and commission together account for :
- (A) 74% of total income (B) 64% of total income
(C) 45% of total income (D) 65% of total income
35. If the total income from interest during the year was Rs.60,000, how much was the income from brokerage and exchange together?
- (A) Rs. 20,000 (B) Rs. 30,000
(C) Rs. 25,000 (D) Rs. 18,000
36. If the total income from commission during the year was Rs.90,000, how much was the income from all the sources together ?
- (A) Rs.9,00,000 (B) Rs.8,80,000
(C) Rs.8,90,000 (D) Rs.7,80,000

Directions for Question 37-42. Answer the question based on given data :

	Company A Rs. Lakhs	Company B Rs. Lakhs	Company C Rs. Lakhs
Sales	280	260	290
Cost of sales	210	200	220
Gross profit	70	60	70
Operating expenses	40	36	40
Operating profit	30	24	28
Tax	20	16	22
Profit after tax	10	8	11

37. The ratio of gross profit to sales in the three companies taken together is approximately :
- (A) 24% (B) 25%
(C) 23% (D) 26%

- 38. The ratio between the tax paid by the three companies taken together to their combined operating expenses is :**
- (A) 19:58 (B) 24:73
(C) 21:64 (D) 29:82
- 39. The ratio between the operating profit of the company B and company C is :**
- (A) 6:7 (B) 5:2
(C) 2:1 (D) 3:4
- 40. The ratio of the combined operating profits of the company B and company C to their combined sales is :**
- (A) 51:550 (B) 521:521
(C) 51:512 (D) 52:550
- 41. What percentage the profits after tax of company C, constitute of its sales ?**
- (A) 3.57% (B) 7.10%
(C) 2.12% (D) 3.79%
- 42. The ratio between sales of the company B to sales of company C is :**
- (A) 25 : 24 (B) 24 : 22
(C) 28 : 29 (D) 23 : 24
- 43. Two trains moving from opposite directions approach each other at 90 km an hour and 80 km an hour from two places 1020 km apart. When will they meet ?**
- (A) after 8 hours (B) after 6 hours
(C) after 7 hours (D) after 5 hours
- 44. When 60% of a number is added to 60, the result is the number again. The number is :**
- (A) 250 (B) 350
(C) 550 (D) 150
- 45. In a class of 30 students in an examination in Mathematics 2 students scored 100 marks each, 5 get zero each and the average of the rest was 50. What is the average of the whole class ?**
- (A) 10 (B) 30
(C) 45 (D) none of these
- 46. A mother after 6 years will be twice the age of her daughter. The sum of their ages is 48. What is the daughter's age today ?**
- (A) 13 (B) 14
(C) 15 (D) none of these
- 47. Successive discounts of 40% and 30% is equivalent to a single discount of :**
- (A) 60% (B) 70%
(C) 58% (D) 62%

48. The cloth shop has announced a reduction in a price by 20%. How many minimum Kurtas priced at Rs. 80 each should one buy to avail a total reduction of at least Rs. 75 ?
- (A) 3 (B) 4
(C) 6 (D) 5
49. 600 bananas were bought for Rs. 225 per hundred and were sold for a profit of Rs. 200; the selling price per dozen is :
- (A) Rs. 16 (B) Rs. 21
(C) Rs. 15 (D) Rs. 31
50. Study the numbers and complete the series by the suitable alternatives given; 3, 6, 10, 15, _____ .
- (A) 21 (B) 28
(C) 27 (D) 25
51. A man divides Rs. 27,440 between his son and daughter in the ratio of 15:13. How much did the son get?
- (A) Rs. 14900 (B) Rs. 15390
(C) Rs. 15820 (D) Rs. 14700
52. Ratio of Seeta's age to Geeta's age is equal to 5:4. Seeta will be 30 years old after 5 years. How old is Geeta now ?
- (A) 15 years (B) 16 years
(C) 17 years (D) 20 years
53. The least number which must be added to 8432 to make it a perfect square is :
- (A) 90 (B) 53
(C) 32 (D) 73
54. The ratio of two numbers is 6:7 and their difference is 30. The smaller number is :
- (A) 190 (B) 191
(C) 180 (D) 172
55. A trader sold two books for Rs. 24000 each. On one he made a net profit of 25% but on the other he lost 20%. Find the net loss or gain in the overall process :
- (A) Rs. 1000 gain (B) Rs. 1000 loss
(C) Rs. 1200 gain (D) Rs. 1200 loss
56. A fraction becomes $\frac{5}{6}$ if 1 is added to both numerator and denominator. If however, 9 is subtracted from both numerator and denominator, the fraction becomes $\frac{14}{17}$. What is the fraction?
- (A) $\frac{227}{234}$ (B) $\frac{228}{239}$
(C) $\frac{149}{179}$ (D) $\frac{117}{1299}$

57. A father's age is three times as much as the sum of the ages of his three children but six years hence his age will be only double the sum of their ages. Find his present age :

- (A) 68 (B) 72
(C) 90 (D) 82

58. Find the odd man out :

- (A) Lady finger (B) Potato
(C) Tomato (D) Cauliflower

59. Shirt is to cloth as bread is to :

- (A) Milk (B) Curry
(C) Noodles (D) Flour

60. Beta is to Delta as 2011 is to :

- (A) 2012 (B) 2014
(C) 2013 (D) 2015

61. A is the only sister of mother of B. What is B to A ?

- (A) Daughter (B) Son
(C) Niece (D) Brother

Certain words/terms are given in questions 62-66. All are similar in nature except one which is different. Pick out the odd one.

62. Cock and hen, horse and mare, peacock and hen, dog and bitch, cow and goat :

- (A) Cock and hen (B) Horse and mare
(C) Peacock and peahen (D) Cow and goat

63. 81, 9, 49, 125, 144 :

- (A) 9 (B) 49
(C) 125 (D) 144

64. Mars, Sky, Jupiter, Sun, Moon :

- (A) Mars (B) Sky
(C) Jupiter (D) Sun

65. Sahara, Arabia, Thar, Sundarban :

- (A) Arabia (B) Thar
(C) Sahara (D) Sundarban

66. RQS, BAC, NMO, KLM, YXZ :

- (A) BAC (B) NMO
(C) KLM (D) YXZ

Directions for question numbers 67 to 70: Two objects, events or concepts are related in some way, you have to establish the same relationship with the other two objects, events or concepts on the basis of the alternatives given below each question.

67. Fruit : Apple :: ? : Taj Mahal

- (A) Monument (B) Building
(C) College (D) School

68. Soldier : Gun :: Blacksmith : ?

- (A) Scissors (B) Iron
(C) Hammer (D) Wood

69. Butter : Milk :: Oil : ?

- (A) Cow (B) Seeds
(C) Curd (D) Grains

70. Handsome : Beautiful :: Husband : ?

- (A) Woman (B) Wife
(C) Girl (D) She

71. X is the father of Y. Y is the daughter of Z. Z is the sister of W. What is W to X ?

- (A) Son in law (B) Nephew
(C) Father in law (D) Brother in law

Pick from answers-choices one which will complete the sentence correctly in questions (72-76).

72. Constitution provides for both fundamental rights _____ fundamental duties.

- (A) As well as (B) And also
(C) And not (D) And not at all

73. Cholera has broken _____ in the town.

- (A) in (B) into
(C) out (D) at

74. Ram is neither intelligent _____ honest.

- (A) nor (B) and
(C) not (D) but

75. You should not avoid _____ medicine.

- (A) for taking (B) to take
(C) in taking (D) taking

76. We should not be ashamed _____ .

- (A) our own servant (B) of being our own servant
(C) in our own servant (D) in being our own servant

In the following questions (77 to 78), choose the most appropriate preposition/s.

77. The hunter who went _____ jungle _____ hunting is missing.

- (A) to, for (B) of, at
(C) at, in (D) for, for

78. The aim _____ conflict management is _____ enhance learning and group outcomes :

- (A) of, to (B) to, of
(C) to, for (D) from , to

In each of the following questions (79–80) a sentence has been given in active voice. Out of the four alternatives suggested select the one which best expresses the same sentence in passive voice.

79. Have the box broken :

- (A) Break the box (B) Have the broken box
(C) Get someone to break the box (D) They have broken the box

80. I know him :

- (A) He has been known by me (B) He was known to me
(C) He is known by me (D) He is known to me

Direction for questions 81-85

Read the following paragraph carefully and answer the questions which follow :

The Small and Medium Enterprises (SMEs) sector contributes significantly to the manufacturing output, employment and exports of the country. It is estimated that in terms of value, the sector accounts for about 45 per cent of the manufacturing output and 40 per cent of the total exports of the country. The sector is estimated to employ about 59 million persons in over 26 million units throughout the country. Further, this sector has consistently registered a higher growth rate than the rest of the industrial sector. There are over 6000 products ranging from traditional to high-tech items, which are being manufactured by the MSMEs in India. It is well known that the SME sector provides the maximum opportunities for both self-employment and jobs after agriculture sector.

The SME sector accounted for more than 17 percent of the GDP in 2014 while contributing to 45 percent of the nation's industrial output and 40 percent of the total exports. The SMEs in India add over 1.3 million jobs per year. With the onset of e-commerce, SMEs have achieved significant advantages such as increased revenues and margins, improved market reach, access to new markets, cost savings in marketing and communication, customer acquisition and improved customer experience.

Currently, there are approximately 48 million SMEs operating in India and the sector employs around 40 percent of the country's labour. Indian SMEs sector currently comprises of 1,157 industrial clusters and 6,000 micro-enterprise clusters. It is characterized as highly fragmented and unorganized and is dispersed across vast geographies. A large portion of the employment generated by SMEs is in the manufacturing and services sectors which are growing at impressive rates of 18 percent and 34 percent year on year respectively. SMEs contribution of 17 percent to India's GDP is much lower when compared to other major economies. It is expected to increase by 22 percent by year 2020. Also, the number of new entrants in the SMEs sector is growing at an average 23 percent in manufacturing and 31 percent in the services sector.

81. By the year 2020 SMEs contribution to India's GDP is expected to increase by :

- (A) 12 percent (B) 17 percent
(C) 25 percent (D) 22 percent

82. Currently approximately how many SMEs are operating in India ?

- (A) 58 million (B) 44 million
(C) 38 million (D) 48 million

83. Approximately how many persons are estimated to have been employed by SMEs in India ?

- (A) 58 million (B) 69 million
(C) 59 million (D) 79 million

84. In 2014 what percentage of the total exports of India was contributed by the SME sector ?

- (A) 17% (B) 45%
(C) 40% (D) 31%

85. SMEs sector is :

- (A) highly consolidated and unorganized (B) highly fragmented and unorganized
(C) highly fragmented and organized (D) highly concentrated and unorganized

ROUGH WORK

CET (PG)-2016

Sr. No. :

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : MBACIT

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point / Black Gel pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **Which organisation is meant to ensure exports from India ?**
(A) EXIM Bank (B) ECGC
(C) Ministry of Commerce (D) None of the above
2. **MUDRA Bank has been set up with the corpus of Rs. _____ crore.**
(A) 20000 (B) 25000
(C) 50000 (D) 100000
3. **Sensitive Sector(s) as defined by RBI :**
(A) Capital Market (B) Real Estate
(C) Commodities (D) All of the above
4. **Sampurna Gramin Rozgar Yojana has been launched from :**
(A) April 1, 2001
(B) Sept. 25, 2001
(C) Sept. 30, 2001
(D) No scheme of such title has been yet launched
5. **VAT is imposed :**
(A) Directly on consumer
(B) On final stage of production
(C) On first stage of production
(D) On all stages between production and final sale
6. **Kutir Jyoti scheme is associated with :**
(A) Promoting cottage industry in village
(B) Promoting employment among rural unemployed youth
(C) Providing electricity to rural families living below the poverty line
(D) All of the above
7. **SEBI is a :**
(A) Statutory body (B) Advisory body
(C) Constitutional body (D) Non-statutory body

- 8. SAARC University will have its head office in :**
- (A) Dhakha (Bangladesh) (B) New Delhi (India)
(C) Colombo (Sri Lanka) (D) Mali (Maldives)
- 9. 'Pure Banking, Nothing Else' is a slogan raised by :**
- (A) ICICI Bank (B) HDFC Bank
(C) SBI (D) UTI Bank
- 10. World Environment Day is celebrated on :**
- (A) June 5 (B) June 9
(C) June 11 (D) June 13
- 11. 'BAFTA' award is associated with :**
- (A) Banking Sector (B) Cinema
(C) Insurance Sector (D) Tourism
- 12. 'SAPTA' is related to :**
- (A) Education (B) Trade
(C) Security (D) Environment
- 13. Which of the following is a subsidiary of RBI ?**
- (A) SIDBI (B) NABARD
(C) National Flousing Bank (D) All of the above
- 14. In which city, the maximum foreign companies are registered ?**
- (A) Bengaluru (B) New Delhi
(C) Gurgaon (D) Mumbai
- 15. What is meant by 'White Label ATM' ?**
- (A) ATM installed in Bank (B) ATM installed outside Bank
(C) ATM installed by non banking companies (D) Swipe machines installed at point of sale
- 16. Interest Rate Policy is a part of :**
- (A) Fiscal Policy (B) Industrial Policy
(C) Monetary Policy (D) None of the above
- 17. What is 'Stagflation' ?**
- (A) Inflation with growth (B) Deflation with growth
(C) Inflation after deflations (D) Inflation with depression

- 18. Inflation is measured in India on the basis of which index ?**
- (A) Consumer Price Index (B) Wholesale Price Index
(C) Retail Price Index (D) Market Forces
- 19. The apex organisation of Industrial finance in India is :**
- (A) IDBI (B) RBI
(C) ICICI (D) IFCI
- 20. Which of the following States has the least poverty ratio in the country ?**
- (A) Goa (B) Kerala
(C) Himachal Pradesh (D) Punjab
- 21. The fall in the price of one commodity leads to increase in demand for other commodity is called :**
- (A) Substitutes (B) Complementaries
(C) Both (A) and (B) (D) None of these
- 22. Who has given four major exceptions to the law of demand :**
- (A) Giffen (B) Samuelson
(C) Beham (D) None of these
- 23. In case of contraction or extension in demand, the movement is along a demand curve whereas in case of increase or decrease, the demand curve will move :**
- (A) Downward (B) Upward
(C) Any of these (D) None of these
- 24. Proportionate Method of measurement of elasticity of demand is also known as :**
- (A) Flux Method (B) Ratio Method
(C) Arithmetic Method (D) All of these
- 25. The law of variable proportions is :**
- (A) Also called law of non-proportional return
(B) Also called law of proportionality
(C) Wider and includes law of increasing returns, law of decreasing returns & law of constant return as three phases
(D) All of these

26. Two conditions are required to be there for the equilibrium under monopoly. These are :

- (A) $MR=MC$ and MC cuts the MR from above
- (B) $MC=MR$ and MR cuts the MC from below
- (C) $MC=AR$ and MC cuts the MR from below
- (D) $MR=MC$ and MC cuts the MR from below

27. The term 'revealed preference' was introduced in the book by :

- (A) Das Capital
- (B) Affluent Society
- (C) Foundations of Economic Analysis
- (D) None of these

28. In case of Giffen goods, price effect is :

- (A) Negative
- (B) Positive
- (C) Zero
- (D) None

29. Cartel is a part of :

- (A) Monopoly
- (B) Oligopoly
- (C) Monopolistic Competition
- (D) Perfect Competition

30. Each seller determines his price on the assumption that his rival will keep his price constant under :

- (A) Edgeworth Model
- (B) Price Leadership
- (C) Bertrand's Model
- (D) Cournot Model

(Directions for Question No. 31-45)

In each of the questions below, a related pair of words in capital letters is followed by four pairs of words. Select the lettered pair that expresses the relationship what is most similar to that in the capitalized pair.

31. STOOL: BENCH

- (A) Chair: Table
- (B) Carpenter: Chair
- (C) Foot Rule : Yardstick
- (D) Wood : Steel

32. APPEAL: REFUSAL

- (A) Obesity: Over-eating
- (B) Deny: Affirmation
- (C) Try: Failure
- (D) Struggle : Victory

33. WEIGHT: KILOGRAM

- (A) Pint: Liquid
- (B) Distance : Kilometre
- (C) Mile : Length
- (D) Pound : Weight

34. WRITER : PEN

- (A) Needle: Tailor
- (B) Artists: Brush
- (C) Paint: Painter
- (D) Teacher: Class

35. INK: PAPER

- (A) Pen : Pencil
- (B) Paint: Painting
- (C) Chalk: Blackboard
- (D) Carbon paper: Ball point pen

36. REMORSE: ABSOLUTION

- (A) Evasion : Suspicion
- (B) Horror: Sympathy
- (C) Disdain: Corruption
- (D) Banter: Passion

37. GOOD : EXCELLENT

- (A) Bad: Immoral
- (B) Caution : Careless
- (C) Hill: Mountain
- (D) Jealousy: Respect

38. JUDGE : ADJUDICATE

- (A) Advocate : Jury
- (B) Mediator: Reconcile
- (C) Lawyer: Client
- (D) Appellant: Implore

39. PAIN: MISERY

- (A) Diseases: Poverty
- (B) Despair: Loneliness
- (C) Ignorance : Confusion
- (D) Superstition : Peasants

40. DUSTER: CHALK

- (A) Blackboard : Chalk
- (B) Erasure: Writing
- (C) Cloth : Air
- (D) Sponge : Water

41. ARCHITECT: BUILDING:: SCULPTOR: ?

- (A) Museum
- (B) Stone
- (C) Chisel
- (D) Statue

42. ICE: COLDNESS: EARTH: ?

- (A) Weight
- (B) Gravitation
- (C) Jungle
- (D) Sea

43. TREE: FRUIT:: SUN : ?

- (A) Light
- (B) Sunshine
- (C) Moon
- (D) Heat

- 44. CONFERENCE : CHAIRMAN :: NEWSPAPER: ?**
- (A) Reporter (B) Distributor
(C) Printer (D) Editor
- 45. GOLF : HOLES :: BASEBALL : ?**
- (A) Innings (B) Goal
(C) Points (D) Serve
- 46. _____ is mandatory if an enterprise presents consolidated financial statements.**
- (A) AS-19 (B) AS-20
(C) AS-21 (D) AS-22
- 47. Which of the following is a method of shifting the risk ?**
- (A) Hedging (B) Underwriting
(C) Insurance (D) All of the above
- 48. Dow and Jones, now popularly known as ‘Dow-Jones’ in the stock market parlance were the :**
- (A) First Financial Journalist
(B) First Bull operators in the New York Stock Exchange
(C) First to predict the Great Depression
(D) Architects of shop-floor trading
- 49. The degree of leverage defined as the percentage change in earnings available to common shareholders that is associated with a given percentage change in EDBIT is called :**
- (A) Combined Leverage (B) Financial Leverage
(C) Operating Leverage (D) Business Leverage
- 50. If a minor chooses to continue as a partner attaining the age of majority, he will be liable to the debts of the firm from the date of his :**
- (A) Attaining Majority
(B) Admission to profits of the firm
(C) Choosing to become a partner at a subsequent date
(D) Guardian giving the option
- 51. Capital profits can be distributed as dividend only if :**
- (A) The Articles of a company permit
(B) They are realised in cash
(C) The surplus remains after the revaluation of all assets
(D) The capital losses have been written off

- 52. Who is the author of the first book with the title “Management by Objectives” ?**
- (A) George Oriorne (B) Peter F. Drucker
(C) David A. Nadler (D) Herbert A. Simon
- 53. Who has given “Theory Z’ of motivation ?**
- (A) Wendell L. French (B) William Ouchi
(C) Robert D. Smith (D) Alfie Kohn
- 54. Who conceptualised a three-dimensional grid, also known as 3-D management ?**
- (A) W.J. Reddin (B) Alvin E. Coons
(C) Paul Hersey (D) James L. Gibson
- 55. The concept of _____ was applied in industries to overcome some of the problems of profit-sharing scheme.**
- (A) Stock Option (B) Co-partnership
(C) Retirement benefits (D) Participation
- 56. ‘Matrix Organisation ‘ refers to form of :**
- (A) Organisation where authority and responsibility co-exist
(B) Organisation in which two or more basic types of departmentation are combined
(C) Mathematical arrangement of events in columns and rows
(D) Organisation where mathematical simulation is used
- 57. Who has given the following definition of planning ?**
“A plan is a trap laid to capture the future.”
- (A) Allen (B) M.H. Newman
(C) McFarland (D) Taylor
- 58. According to the decision of Garner vs. Murray, in the absence of any agreement to the contrary, the deficiency of the insolvent partner must be borne by other solvent partners in :**
- (A) Profit-sharing ratio
(B) Capital ratio which stood after the dissolution of the firm
(C) Capital ratio which stood before the dissolution of the firm
(D) Equal proportion
- 59. A company issued Rs. 4, 00,000, 4% bonds repayable in equal instalments over 10 years. What is the amount required in the initial year, to pay interest and to redeem the bonds (ignore tax and D.C.F.) ?**
- (A) Rs. 12,000 (B) Rs. 56,000
(C) Rs. 40,000 (D) Rs. 16,000

- 60. The annual consumption of a material is 1,800 units, ordering costs are @ Rs. 2 per order, price per unit of the material is 32 paise and storage costs are 25% per annum of stock value find the economic order quantity :**
- (A) 100 units (B) 200 units
(C) 250 units (D) 300 units
- 61. Which of the following are components of Central Processing Unit (CPU) ?**
- (A) Arithmetic logic unit, Mouse (B) Arithmetic logic unit, Control unit
(C) Arithmetic logic unit, Integrated Circuits (D) Control Unit, Monitor
- 62. The first computer introduced in Nepal was :**
- (A) IBM 1400 (B) IBM 1401
(C) IBM 1402 (D) IBM 1403
- 63. MICR stands for :**
- (A) Magnetic Ink Character Reader (B) Magnetic Ink Code Reader
(C) Magnetic Ink Cases Reader (D) None
- 64. Chief component of first generation computer was ?**
- (A) Transistors (B) Vacuum Tubes and Valves
(C) Integrated Circuits (D) None of the above
- 65. EEPROM stands for :**
- (A) Electrically Erasable Programmable Read Only Memory
(B) Easily Erasable Programmable Read Only Memory
(C) Electronic Erasable Programmable Read Only Memory
(D) None of the above
- 66. In which of the following form, data is stored in computer ?**
- (A) Decimal (B) Binary
(C) Hexa Decimal (D) Octal
- 67. Technology used to provide internet by transmitting data over wires of telephone network is :**
- (A) Transmitter (B) Diodes
(C) HHL (D) DSL

- 68. Which level language is Assembly Language ?**
- (A) High-level programming language (B) Medium-level programming language
(C) Low-level programming language (D) Machine language
- 69. Which of following is used in RAM ?**
- (A) Conductor (B) Semi Conductor
(C) Vacuum Tubes (D) Transistor
- 70. CD-ROM stands for :**
- (A) Compactable Read Only Memory (B) Compact Data Read Only Memory
(C) Compactable Disk Read Only Memory (D) Compact Disk Read Only Memory
- 71. Which among following is secondary storage device ?**
- (A) Hard Disk (B) RAM
(C) Diode (D) Semi Conductor
- 72. The output quality of a printer is measured by :**
- (A) Dot per inch (B) Dot per sq. inch
(C) Dots printed per unit time (D) All of the above
- 73. The system unit of a personal computer typically contains all of the following except :**
- (A) Microprocessor (B) Disk Controller
(C) Serial interface (D) Modem
- 74. Random Access Memory (RAM) is which storage of device ?**
- (A) Primary (B) Secondary
(C) Tertiary (D) Offline
- 75. MPG is a file extension of which type of files ?**
- (A) Audio (B) Image
(C) Video (D) Flash

ROUGH WORK

CET(PG)-2016

Question Booklet Series : A

Sr. No. :

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

In Figures

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of the Candidate : _____

Subject : M. Sc. (Hons. School/2 Year Course)-Biotechnology

Time : 90 minutes

Number of Questions : 75

Maximum Marks : 75

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
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16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

1. **What would be the isoelectric point of phenylalanine if pKa for COOH group is 1.54 and the NH₃⁺ group is 8.54 ?**
 - (A) 1.54
 - (B) 5.04
 - (C) 8.54
 - (D) 10.08

2. **Which is a correct statement ?**
 - (A) A protein will have + ve charge at pH below its isoelectric point
 - (B) A protein will have + ve charge at pH above its isoelectric point
 - (C) pH does not affect charge on a protein
 - (D) A protein will have - ve charge at pH below its isoelectric point

3. **Which of the following statements is correct ?**
 - (A) An aqueous solution of a strong base will dissociate to form conjugate acid
 - (B) The pH of a buffer does not change with dilution
 - (C) The pH of a buffer does not change with temperature
 - (D) A strong electrolyte solution always contain high concentration of acid or base

4. **Peptide bond in a protein absorbs UV at :**
 - (A) 280 nm
 - (B) 260 nm
 - (C) 230 nm
 - (D) 200 nm

5. **Tertiary structure of globular proteins is stabilized primarily by :**
 - (A) Ionic interactions
 - (B) Vander Waal's forces
 - (C) Hydrophobic interactions
 - (D) Disulfide bonds

6. **Which of the following is possible with SDS PAGE ?**
 - (A) Determination of isoelectric point of a protein
 - (B) Determine biological activity of a protein
 - (C) Separate proteins on the basis of charge
 - (D) Separate proteins on the basis of molecular mass

- 7. Which disease is not related to protein misfolding ?**
- (A) Alzheimer
 - (B) Kuru
 - (C) Ataxia telangiectasia
 - (D) Creutzfeld-Jakob disease
- 8. In a helix turn helix motif of a repressor which amino acid likely to interact with DNA ?**
- (A) Glycine
 - (B) Lysine
 - (C) Glutamate
 - (D) Aspartate
- 9. Why is collagen assembly sensitive to substitution of glycine with any other amino acids in its primary sequence ?**
- (A) Glycine is cross linked to lysine in the triple helix
 - (B) Collagen is glycosylated at the glycine residues
 - (C) Side chains of glycine fit well into the space available in the triplex helix of collagen
 - (D) Interchain hydrogen bonding is done by glycine
- 10. In prokaryotes translation is guided by :**
- (A) TATA box
 - (B) Pribnow-Schaller box
 - (C) Shine Dalgarno sequence
 - (D) Kozak sequence
- 11. RNA has maximum stability at which pH ?**
- (A) Acidic pH
 - (B) Alkaline pH
 - (C) Neutral pH
 - (D) Not stable at both acid and alkaline pH
- 12. What is the function of peroxisome ?**
- (A) Oxidation of fatty acids with production of energy
 - (B) Oxidation of fatty acids with production of hydrogen peroxide
 - (C) Oxidation of sugars without ATP production
 - (D) Production of acid hydrolases

- 13. Which of the following is likely to happen during purification of a protein by column chromatography ?**
- (A) Protein with less charge will elute at high salt concentration
 - (B) Protein with high charge will elute at low salt concentration
 - (C) Large protein will elute slowly from gel filtration column
 - (D) Small protein will elute slowly from gel filtration column
- 14. A functional unit of a protein that can fold independently :**
- (A) Motif
 - (B) Fold
 - (C) Domain
 - (D) Module
- 15. Antibiotic tetracycline blocks protein synthesis by inhibiting :**
- (A) Binding of amino acyl tRNA to ribosome
 - (B) Peptidyl transferase
 - (C) Translocase
 - (D) Binding of large subunit of ribosome mRNA
- 16. Which initiation facto prevents charged tRNA other than initiator tRNA to be associated with small subunit of ribosome ?**
- (A) IF 1
 - (B) IF 2
 - (C) IF 3
 - (D) IF 4
- 17. Which of the following characteristics is not shared by haemoglobin and myoglobin ?**
- (A) Presence of heme as the prosthetic group
 - (B) Multi subunit protein
 - (C) Reversible binding of oxygen
 - (D) Involvement of histidine residue in oxygen binding

18. Which of the following is observed after series of successive purification steps for a protein ?
- (A) Specific activity and percentage yield of the protein will decrease
 - (B) Specific activity will remain same but percentage yield of the protein will increase
 - (C) Specific activity will decrease but percentage yield of the protein will increase
 - (D) Specific activity will increase but percentage yield of the protein will decrease
19. Which glycolytic enzyme is not allosterically controlled ?
- (A) Hexokinase
 - (B) Phosphofructo kinase
 - (C) Phosphoglycerate kinase
 - (D) Pyruvate kinase
20. Which enzyme combination will give maximum alcohol production from starch ?
- (A) α -amylase and glucose isomerase
 - (B) α -amylase and β -amylase
 - (C) β -amylase and glucoamylase
 - (D) α -amylase and glucoamylase
21. When do you expect highest level of transcription from *E.coli* lac promoter ?
- (A) Low glucose high lactose concentration in medium
 - (B) High glucose high lactose concentration in medium
 - (C) High glucose low lactose concentration in medium
 - (D) Low glucose low lactose concentration in medium
22. Which of the following industrial enzymes is not involved in the activity listed ?
- (A) α – amylase in beer making
 - (B) renin in cheese making
 - (C) papain as meat tenderizer
 - (D) protease in detergent
23. Based on the given data on enzyme kinetics which is the best substrate for the enzyme :
- | | Km (mM) | Kcat (Sec ⁻¹) |
|-----|---------|---------------------------|
| (A) | 0.01 | 2×10^{-2} |
| (B) | 0.1 | 4×10^{-4} |
| (C) | 1.0 | 2×10^2 |
| (D) | 10 | 7×10^1 |

- 24. Which statement is true for *E.coli* tac promoter ?**
- (A) It is a strong constitutive promoter used for high level of expression of heterologous proteins in *E.coli*
 - (B) It is a weak promoter used for expression of toxic heterologous proteins in *E.coli*
 - (C) It contains –10 region of trp promoter and – 35 of lac promoter
 - (D) It is repressed by lac repressor and derepressed by IPTG
- 25. Tryptophan acts as _____ in regulating tryptophan operon.**
- (A) Inducer
 - (B) Repressor
 - (C) Co-repressor
 - (D) Enhancer
- 26. Which enzyme is not associated with gene silencing ?**
- (A) Histone methyl transferase
 - (B) Histone deacetylase
 - (C) Histone acetyl transferase
 - (D) DNA methyl transferase
- 27. Which of the following factor will not activate lytic phase of lamda phage ?**
- (A) Abundance of CI protein
 - (B) High level of cro protein
 - (C) Activation of rec A
 - (D) Environmental stress
- 28. Which virus is associated with microcephalopathy ?**
- (A) Chikungunya
 - (B) Zika
 - (C) Ebola
 - (D) Hunta
- 29. Which is wrongly paired ?**
- | | |
|--------------------------------|---------------------------------|
| (A) Infection through aerosols | — Polio |
| (B) Nosocomial infection | — <i>Pseudomonas aeruginosa</i> |
| (C) Food intoxication | — <i>Staphylococcus aureus</i> |
| (D) Zoonosis | — Ebola |

40. **Thymine-Thymine dimers formed in DNA by UV exposure are repaired by bacteria through :**
- (A) Mismatch repair
 - (B) Excision repair
 - (C) End Joining repair
 - (D) SOS repair
41. **How many chromosomes are present in *Agrobacterium tumefaciens* ?**
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
42. **Rolling circle replication is not shown by :**
- (A) M13 phage
 - (B) Lamda phage
 - (C) Adenovirus
 - (D) Herpesvirus
43. **Which of the following can degrade cell wall of non dividing bacteria ?**
- (A) Penicillin
 - (B) Ampicillin
 - (C) Lysozyme
 - (D) Chitinase
44. **Mark the correct order on the bases of genome size :**
- (A) *E.coli* > *S. cerevisiae* > *H. influenza* > $\Phi \times 174$
 - (B) *H.influenza* > *E.coli* > *S. Cerevisiae* > $\Phi \times 174$
 - (C) *S. Cerevisiae* > *E.coli* > *H. influenza* > $\Phi \times 174$
 - (D) $\Phi \times 174$ > *S. Cerevisiae* > *E.coli* > *H. influenza*
45. **Which BLAST program would be used to search translated nucleotide data base using a protein query ?**
- (A) Blast X
 - (B) tblast X
 - (C) tblast n
 - (D) Blast p

46. Which of the ozone depleting substance has not been phased out from India ?
- (A) CFC
 - (B) HCFC
 - (C) Halons
 - (D) CTC
47. In 2015, the meeting on climate change was held in :
- (A) Paris
 - (B) Brazil
 - (C) Copenhagen
 - (D) Brussels
48. Which is not true about nitrobacter ?
- (A) It is a nitrifying bacteria
 - (B) Nutritionally it is a chemolithoautotroph
 - (C) It can oxidize ammonia
 - (D) It uses oxygen as the final acceptor of electrons
49. Which enzyme plays an important role in degradation of xenobiotics ?
- (A) Superoxide dismutase
 - (B) Methyltransferase
 - (C) Oxidoreductase
 - (D) Hydrolase
50. *In situ* cleaning up of contaminated soil cannot be done by :
- (A) Bioaugmentation
 - (B) Biostimulation
 - (C) Co-metabolism
 - (D) Dredging
51. Major source of sulphur dioxide is :
- (A) Power plants
 - (B) Industries
 - (C) Automobiles
 - (D) Volcanic emissions

52. Mark the incorrect statement :

- (A) Recombinant cosmids are single copy plasmids that can be packaged into lamda phage heads
- (B) A recombinant lamda phage cannot package DNA insert less than 38 kb.
- (C) BACs are high capacity but single copy vectors
- (D) Transformation efficiency of recombinant plasmid decreases when insert is more than 15 kb.

53. Which of the following enzyme does not show proof reading activity ?

- (A) Klenow fragment
- (B) *E.coli* DNA Polymerase I
- (C) Taq DNA polymerase
- (D) T7 DNA polymerase

54. Mark the wrong statement :

- (A) YEp based on 2 μ plasmid have been extensively used for production of heterologous proteins
- (B) *Pichia pastoris*, a methylotrophic yeast has been used for production of biopharmaceuticals
- (C) Yeast cells can carry out post translational modifications of eukaryotic proteins
- (D) Yeast cells can be used for efficient expression of heterologous genes under inducible alcohol dehydrogenase promoter

55. Which is the simplest technique to check the differential expression of genes ?

- (A) Genomes sequencing
- (B) Real time PCR
- (C) Microarray
- (D) Transcriptome analysis

56. Major drawback of current gene therapy vector system is :

- (A) Immunogenicity
- (B) Lack of cell specificity
- (C) Delivery into cell nucleus
- (D) Degradation of therapeutic gene

57. Which statement is incorrect ?

- (A) Bt brinjal has improved crop yield in India
- (B) Bt brinjal is resistant to lepidopterans
- (C) Bt cotton seeds are supplied by Mahyco Biotech
- (D) Lepidopterans have shown resistance to Bt cotton

- 58. For nick translation of DNA identify the requirements :**
- (A) DNA polymerase, DNase, primers, dNTPs, ligase
 - (B) DNA polymerase, S1 nuclease, labelled dNTPs, ligase
 - (C) DNA dependent RNA polymerase, DNase, labelled dNTPs, ligase
 - (D) DNA polymerase 1, DNase, labelled dNTPs, ligase
- 59. Horizontal gene transfer can occur through all except :**
- (A) conjugation
 - (B) binary fission
 - (C) transposons
 - (D) phages
- 60. Pfu polymerase is used in PCR because of its :**
- (A) High thermal stability
 - (B) High fidelity
 - (C) High processivity
 - (D) Low RNase activity
- 61. The landmark discovery that dsRNA can repress gene expression was done in :**
- (A) *Drosophila*
 - (B) *Zebra fish*
 - (C) *Caenorhabditis elegans*
 - (D) *Arabidopsis thaliana*
- 62. Under which of the following growth conditions, recombinant culture would give least biomass ?**
- (A) A continuous reactor with low concentration of glucose
 - (B) A fed batch reactor with low glucose concentration
 - (C) A batch fermentation with low initial glucose concentration
 - (D) A batch fermentor with high initial glucose concentration
- 63. Which statement about cDNA library is incorrect ?**
- (A) RNA is used as the template
 - (B) It enriches coding sequences
 - (C) It is bigger than genomic library
 - (D) It is useful for cloning of eukaryotic genes

- 64. Which enzyme is used for labelling of 5' end of DNA ?**
- (A) Ligase
 - (B) Terminal transferase
 - (C) Alkaline phosphatase
 - (D) Polynucleotide kinase
- 65. Flavr Savr tomatoes were created by RNAi technology using :**
- (A) Electroporation
 - (B) Gene gun
 - (C) Protoplast fusion
 - (D) *Agrobacterium tumefaciens*
- 66. Yeast cells can be transformed by :**
- (A) Lithium chloride
 - (B) Calcium chloride
 - (C) Electroporation in the presence of sodium chloride
 - (D) Calcium chloride in the presence of PEG
- 67. Who is the Father of Green Revolution ?**
- (A) Norman Borloug
 - (B) David Petrick
 - (C) Paul Berg
 - (D) Nathan Arber
- 68. Which method is most suitable to produce alkaloids in plant tissue culture ?**
- (A) Pollen culture
 - (B) Callus culture
 - (C) Embryo culture
 - (D) Suspension culture
- 69. Binary vector used for transformation of plants does not contains :**
- (A) Vir genes
 - (B) Transgene
 - (C) Left and right border sequences
 - (D) *E.coli* origin of replication

ROUGH WORK