Question Booklet Series: **A** *Question Booklet Serial No.* 320340

Ph.D. Entrance Test – 2015

Subject: Business Management and Commerce

Paper – I

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

Roll No. ***In Figure*** ***In Words***

O.M.R. Answer Sheet Serial No.

Signature of Candidate: _____ *Signature of Invigilator:* _____

Time: 60 Minutes **Number of Questions: 50** **Maximum Marks: 50**

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

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. 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. Please check that this Question Booklet contains 50 Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (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. There shall be no negative marking for wrong answers.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. 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.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. 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.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant 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.
14. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
15. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. Let x, y and z, respectively, be the mean, median and mode of a negatively skewed data set. Then the relationship between x, y, z is

   A) x= y= z B) x< y<z C) x>y>z D) x<z<y

2. The median of the data 6, 16, 9, 7, 5, 11, 18, 14 is:

   A) 6 B) 9 C) 10.8 D) None of these

3. The mean and variance of a data set are 12 and 4, respectively. If 4 is added to each data value then the mean and standard deviation, respectively will be:

   A) 16 and 4 B) 12 and 2 C) 12 and 8 D) 16 and 2

4. Three unbiased dice are thrown simultaneously. The probability that exactly two will show even numbers on the upper face is:

   A) 3/8 B) 1/2 C) 1/4 D) 1/8

5. The Poisson distribution is:

   A) Symmetric B) Positively skewed
   C) Negatively skewed D) Log skewed

6. The variance of a data set is 36. If each data value is divided by 3, then the standard deviation will be:

   A) 6 B) 36 C) 4 D) 2

7. The value of coefficient of kurtosis (β_2) of Gaussian distribution is:

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

8. It is known that 10% items produced by a firm are defective. The probability that there will be exactly on defective item in a sample of five items produced by this firm is:

   A) .328 B) .672 C) .0656 D) .934

9. One ticket is drawn randomly from a bag containing 10 lottery tickets which are numbered from 1 to 10. The probability that the number on the ticket is even or a multiple of three is:

   A) 5/10 B) 3/10 C) 8/10 D) 7/10

10. The mean, mode and standard deviation of a data set are 12, 15 and 3 respectively. Based on this information, the distribution associated with these data set is expected to be:

    A) Symmetric B) Platykurtic
    C) Negatively skewed D) Positively skewed

11. Let A and B be two independent events in a sample space S such that P(A)= .3 and P(B) = .5. Then the value of P(A∪B) is:

    A) .80 B) .15 C) .95 D) .65

12. Let P be the population proportion of smokers in a region. Let in a sample of n individuals selected from this region, a random number, say X, are smokers. Then $p = X/n$ as an estimator of P is:

A) Biased
B) Unbiased
C) Consistent
D) Consistent and Unbiased

The following data represent the frequency distribution of daily wages of workers in a firm:

Wage Group:	500-750	750-1000	1000-1250	1250-1500	1500 and above
No. of workers:	10	15	12	8	5

Use this information to answer **questions 13 and 14.**

13. The most appropriate measure of central tendency for these data is:

A) Arithmetic Mean B) Median C) Harmonic mean D) Geometric mean

14. The most appropriate measure of dispersion for these data is:

A) Range
B) Mean Deviation
C) Quartile Deviation
D) Standard Deviation

15. Let T be an unbiased estimator of parameter θ and F be the class of all unbiased estimators of θ. If Variance (T) < Variance (S) for all S in F, then estimator T is called:

A) Sufficient
B) Variance Bounded
C) Uniformly unbiased
D) Minimum Variance Unbiased

16. A sample of two items was drawn from a lot containing 4 good and 2 bad items using simple random sampling without replacement. The probability that sample contains one good and one bad item is:

A) 8/15 B) 4/45 C) 1/3 D) 2/25

17. The sum of squares of deviations of data values is minimum when the deviations are taken from:

A) Median B) Mode C) Mean D) Harmonic Mean

18. Let the consumer price index of workers in an area is 400. The purchasing power of one rupee as compared to base period will be:

A) 4 times higher
B) Reduced to 1/2
C) Remains same
D) Reduced to 1/4

19. The mean deviation of a data set is minimum when the deviations are taken from:

A) Mode B) Median C) Mode D) Geometric Mean

20. In one way ANOVA, there are six data values of monthly sales under each of the four advertising methods. The degrees of freedom associated with the error are:

A) 3 B) 23 C) 20 D) 24

21. The error in ANOVA is the variation in the data due to:

A) Missing values
B) Mistake by investigator
C) All assign sources
D) All Unassignable Sources

22. The values of both the regression coefficients in a bivariate regression analysis are .7 and 1.7. The value of Karl Pearson's correlation coefficient is:

A) .84 B) .91 C) -.91 D) -.84

23. The value of p at which the function $f(p) = 6p(1-p)$ attains the maximum value is:

A) 1/2 B) 1/4 C) 3/4 D) More than 1

24. The distribution of the test statistic used to test the independence of attributes is:

A) Z B) Student's t C) F D) Chi-square

25. The distribution of the test statistic used to test the hypothetical value of the mean of a normal distribution, when the variance is unknown and sample size is small, is:

A) Z B) Student's t C) F D) Chi-square

26. A sample of three items was drawn with replacement from a lot containing 4 bad and 6 good items. The probability the sample contains two good and one bad items is:

A) .144 B) .288 C) .432 D) .568

27. Let θ be the population proportion of an attribute in a large population and p be its unbiased estimator based on a sample of size n. The standard deviation of p is:

A) $\theta(1-\theta)$ B) $n\theta(1-\theta)$ C) $[\theta(1-\theta)/n]$ D) $[\theta(1-\theta)/n]^{1/2}$

28. An experimenter decided to carry out the analysis to see the effect on sales of a company due to four adverting methods in six different sale regions by taking one value of sale corresponding to each of the twenty four combinations of advertising method and the sale region. The degrees of freedom associated with the error are:

A) 8 B) 15 C) 23 D) 5

29. The number of components in which total variation is separated in two way ANOVA with one observation per cell is:

A) One
B) Two
C) Three
D) Equal to error degrees of freedom

30. Suppose there is not much variation among sampling units of a finite population with respect to the characteristic under study. Then the more appropriate sampling scheme to select a random sample is:

A) Systematic B) Simple random C) Cluster D) Stratified

31. Two stage sampling is a compromise between the sampling schemes:

A) Systematic and Simple Random
B) Simple Random and cluster
C) Systematic and Stratified
D) Cluster and Stratified

The values of Karl Pearson's correlation coefficients obtained from a tri-variate data set are $r_{12} = .7$, $r_{23} = r_{31} = -.5$. Use this information to answer questions **32 and 33**

32. The value of partial correlation coefficient $r_{23.1}$ is:

A) .15 B) .2425 C) .3921 D) .2941

33. The value of multiple correlation coefficient $R_{1.23}$ is:

A) .72 B) .52 C) .39 D) .2425

34. A time series involves annual data. The component of the time series which cannot be estimated from these data is:

A) Trend B) Seasonal C) Cyclic D) Cyclic and seasonal

35. The arithmetic mean of first n natural numbers is:

A) $(n-1)/2$ B) $n(n+1)/2$ C) $n(n-1)(2n+1)/6$ D) $(n+1)(2n+1)/6$

36. All odd order central moments of a positively skewed distribution are:

A) Positive B) Negative C) Zero D) Any real value

37. The probability is .5 that a worker in a factory is smoker. The probability is .09 that a worker of the factory suffers from respiratory problem if he is a smoker. The probability that a worker selected randomly is a smoker and also suffers from respiratory problem is:

A) .59 B) .405 C) .045 D) .41

38. Let x and y be the current year chain base index and previous year fixed base index. The current year fixed base index is:

A) $(x/y)\ 100$ B) xy C) $(xy)/100$ D) $[(xy)/100]^{1/2}$

39. Let P and Q be the quantity and price indices, respectively, without multiplication by 100. The value index without multiplication by 100 is:

A) Q/P B) Q+P C) QP/100 D) PQ

40. Circular test is satisfied by the index number obtained by:

A) Laspeyre B) Paasche
C) Fisher D) Geometric mean of price relatives

41. The demand function of a commodity is $p=4-5x^2$, where x are the number of units in demand when per unit price is p. The value of x for which the elasticity of demand will be unity is:

A) $2/(15)^{1/2}$ B. $2/(5)^{1/2}$ C) 0 D) 4/5

42. An investigator has classified the industries in a region into three mutually exclusive groups labelled as small, medium and large on the basis of their annual turnover. The appropriate sampling scheme to select a sample of industries having adequate representation of all the three categories of industries is:

A) Simple random B) Systematic C) Cluster D) Stratified

The following data represent the percentages of students admitted in different disciplines in an educational institute:

Discipline:	Arts	Science	Languages	Medical	Education	Mathematics	Engineering
Percentages:	10	15	25	12	20	8	10

There are 144 students in Mathematics. Answer questions **43 to 46** using this information:

43. Total students in the institute are:

A) 1200 B) 1800 C) 600 D) 300

44. Ten percent students in Engineering are from rural areas. The engineering students from urban areas are:

A) 18 B) 120 C) 180 D) 162

45. Twenty percent students in science are girls. The number of boys in science are:

A) 54 B) 270 C) 216 D) 81

46. The ratio of number of students in science to the number of students in medical in the institute is:

A) 9:8 B) 11:12 C) 4:5 D) 5:4

47. The standard error of first n natural numbers is:

A) $[(n+1)/2]^{1/2}$ B) $[n(n+1)(2n+1)]/6$ C) $(n^2-1)/12$ D) $\{(n^2-1)/12\}^{1/2}$

48. The statistical significance of a regression model is tested by a statistic whose distribution is:

A) Student's t B) F C) Chi square D) Standard normal

The two regression lines in a simple bivariate regression analysis are $2x-3y-2$ and $5x+6y-5$. Use this information to answer questions **49 and 50.**

49. The value of Karl Pearson's correlation coefficient is:

A) .8 B) .89 C) -.89 D) -.8

50. If the standard deviation of x series is 4 then the standard deviation of y series is:

A) 2.99 B) .8 C) 1/4 D) 4

x-x-x