Reg No:_____

B

Course Code: MTH302
Course Title: PROBABILITY AND STATISTICS

Time Allowed: 3 hrs **Max. Marks: 70**

Read the following instructions carefully before attempting the question paper.
1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This question paper is divided into two parts A and B.
3. Part A contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
4. Part B contains 5 questions of 10 marks each. Attempt any 4 questions out of these 5 questions. In case all the 5 questions are attempted then only the first four attempted questions will be evaluated.
5. Attempt all the questions in serial order.
6. Do not write or mark anything on the question paper except your registration no. on the designated space.
7. After completion of first 90 minutes, the OMR sheet will be taken by the invigilator.
8. Submit the question paper and the rough sheet(s) along with the answer sheet to the invigilator before leaving the examination hall.

Part A

Q.1 (1) Correlation coefficient is independent of
- A. change of origin
- B. change of Scale
- C. change of origin and scale both
- D. none

(2) The range of correlation coefficient is lie between
- A. -2 to 2
- B. -1 to 0
- C. 0 to 1
- D. -1 to 1

(3) The term "regression" was given by
- A. P C Mahalanobis
- B. R A Fisher
- C. Francis Galton
- D. Karl Pearson

(4) The independent variable is used to explain the dependent variable in
- A. linear regression analysis
- B. multiple regression analysis
- C. non-linear regression analysis
- D. none

(5) If one of the regression coefficients is greater than unity, the other must be
- A. equal to unity
- B. greater than unity
- C. equal to zero
- D. less than unity

(6) Which of the following is correct?
- A. Correlation coefficient is the arithmetic mean between the regression coefficients
- B. Correlation coefficient is the harmonic mean between the regression coefficients
- C. Correlation coefficient is the geometric mean between the regression coefficients
- D. None

(7) Regression coefficients are independent of the
- A. change of origin but not of scale
- B. change of scale but not of origin
- C. change of scale only
- D. change of origin only

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(8) if a constant 5 is subtracted from each of variables X and Y then the regression coefficient is
A. reduced by 5
B. increased by 5
C. not changed
D. increased by 25

(9) Which of the following techniques is an analysis of the relationship between two variables to help provide the prediction mechanism?
A. Standard error
B. Correlation
C. Regression
D. None

(10) Which of the following statements is true about the regression line?
A. A regression line is also known as the line of the average relationship
B. A regression line is also known as the estimating equation
C. A regression line is also known as the prediction equation
D. All of the above

(11) What is the meaning of the testing of the hypothesis?
A. It is a significant estimation of the problem
B. It is a rule for acceptance or rejection of the hypothesis of the research problem
C. It is a method of making a significant statement
D. None

(12) The original hypothesis is known as
A. alternative hypothesis
B. null hypothesis
C. both A and B are incorrect
D. both A and B are correct

(13) Power of a test is determined by
A. type –I error
B. probability of type –I error
C. probability of type –I I error
D. level of significance

(14) Most powerful test is for
A. simple vs simple hypothesis
B. simple vs composite hypothesis
C.composite vs composite hypothesis
D. all the above

(15) Sampling distribution is
A. the distribution of population parameter
B. the distribution of statistics
C.the distribution of the sample
D. the distribution of population

(16) Which type of error is more necessary to be minimized in a testing
A. type I error
B. type II error
C.both have equal importance
D. none

(17) The maximum likelihood estimates, which are obtained by maximizing likelihood function, are generally
A. unbiased and inconsistent
B. unbiased and consistent
C. consistent and invariant
D. invariant and unbiased

(18) Which one of the following statements about MLE is not true?
A. MLEs are consistent
B. MLEs are sufficient
C. MLEs are efficient
D. MLEs are unbiased

(19) Minimum variance unbiased estimator (MVUE)
A. always may not exist
B. always exist
C. A and B both
D. none

(20) Likelihood function is the function of
A. unknown parameter
B. sample values
C. function of sample values for given parameter
D. function of parameter for given sample values

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(21) A hypothesis that states zero difference or no difference between parameter and its assumed value is known as
A. simple hypothesis
B. directional hypothesis
C. non-directional hypothesis
D. null hypothesis

(22) If a researcher has to test the hypothesis whether a difference between the means of two groups is significant, she/he will use
A. t-test
B. Z-test
C. F-test
D. none

(23) A paired t-test consist of n pairs of observations. What is the no. of df of the test?
A. 2n-1
B. n-1
C. n
D. 2n

(24) Characteristics of a good estimator is/are
A. unbiasedness
B. sufficient
C. efficient
D. all of the above

(25) Goodness of fit of a distribution is tested by
A. t-test
B. F-test
C. Z-test
D. chi-square test

(26) The sum of two independent chi-square variates is also a
A. gamma variate
B. chi-square variate
C. beta variate
D. none

(27) The t-distribution is
A. symmetric
B. positively skewed
C. negatively skewed
D. none

(28) An estimator is a function of
A. parameter
B. sample values
C. both A and B
D. none

(29) If the values of two variables move in the same direction
A. correlation is said to be non-linear
B. correlation is said to be linear
C. correlation is said to be positive
D. correlation is said to be negative

(30) Which of the following statements is true about the arithmetic mean of two regression coefficients?
A. It is less than the correlation coefficient
B. It is equal to the correlation coefficient
C. It is greater than the correlation coefficient
D. It is greater or equal to the correlation coefficient

Part B

Q.2 For any two events S and T, prove that
$P(S \cap T) \geq P(S) + P(T) - 1$ [10 Marks]

Q.3 Let X and Y are two independent random variables. Show that
$Var(aX + bY) = a^2Var(X) + b^2Var(Y)$ [10 Marks]

Q.4 Prove that sum of two independent Poisson variate is also a Poisson variate. [10 Marks]

Q.5 State and prove the Central limit theorem. [10 Marks]

Q.6 Define the coefficient of correlation. If X and Y are standard normal variables with correlation coefficient ρ, then show that the correlation coefficient between X^2 and Y^2 is ρ^2. [10 Marks]

-- End of Paper --