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### B.Tech. (ME) (2012 Onwards) (Sem.–6) STATISTICAL AND NUMERICAL METHODS IN ENGINEERING Subject Code : BTME-604

M.Code: 71188

Time: 3 Hrs.

Max. Marks : 60

#### **INSTRUCTIONS TO CANDIDATES :**

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

#### **SECTION-A**

#### Write briefly :

- 1. Give two properties of normal distribution.
- 2. What do you mean by stratified sampling?
- 3. A bag contains 6 white, 4 red and 10 black balls. Two balls are drawn at random. Find the probability that they will both be black.
- 4. Differentiate bisection and Newton-Raphson methods.
- 5. Discuss Modified Euler's Method.
- 6. Define level of significance.
- 7. How Histogram is different from bar chart?
- 8. Calculate median of this data set (1, 2, 3, 4, 5, 6, 7, 8). Round off your answer to one decimal place.
- 9. Mean is greater than median (True or false).
- 10. State Simpson's 1/3 rule.



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#### **SECTION-B**

11. The specimen of copper wires drawn form a large lot have the following breaking strength (in kg. weight) :

578, 572, 570, 568, 572, 578, 570, 572, 596, 544

Test (using t-statistic) whether the mean breaking strength of the lot may be taken to be 578 kg. weight (Test at 5% level of significance and table value of t = 2.262 at 9 d.f.).

- 12. Consider B. Tech. class with 45 female students and 55 male students. Only 25 females have cleared a statistical exam whereas 30 males have cleared the same exam. On the basis of above information, answer the following questions :
  - a) What is the probability that a randomly chosen student is a male?
  - b) What is the probability that a randomly chosen student has cleared the exam?
  - c) What is the approximate probability that a randomly chosen student has cleared the exam, given the student is female?
- 13. Find the number of terms of the exponential series such that their sum gives the value of  $e^x$  correct to six decimal places at x = 1.
- 14. Find a real root of  $2x \log_{10} x = 7$  correct to four decimal places using iteration method.
- 15. In the table below, the values of y are consecutive terms of a series of which 23.6 is the  $6^{th}$  term. Find the first and tenth terms of the series :

<b>x</b> :	3	4	5	6	7	8	9		
у:	4.8	8.4	14.5	23.6	36.2	52.8	73.9		

## SECTION-C

16. From the table below, for what value of x, y is minimum? Also find this value of y.

<b>x</b> :	3	4	5	6	7	8
<b>y</b> :	0.205	0.240	0.259	0.262	0.250	0.224

17. Solve 10x - 7y + 3z + 5u = 6,

-6x + 8y - z - 4u = 5,

3x + y + 4z + 11u = 2,

5x - 9y - 2z + 4u = 7 by Gauss-Jordan method.

18. Apply Runge-kutta method to find approximate value of y for x = 0.2, in steps of 0.1, if  $dy/dx = x + y^2$ , given that y = 1 where x = 0.

# NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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