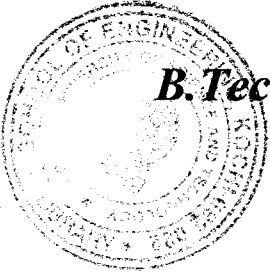


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## B.Tech. Degree V Semester Examination November 2018

CE/CS/EC/EE/IT/ME/SE

AS 15-1501 NUMERICAL AND STATISTICAL METHODS

(2015 Scheme)

Time : 3 Hours

Maximum Marks : 60

### PART A (Answer ALL questions)

(10 × 2 = 20)

- I. (a) Find an iterative formula to find  $\sqrt{N}$ , where N is a positive number and hence find  $\sqrt{5}$ .
- (b) Explain the conditions for convergence of a system of equations in Gauss Seidal iteration method.
- (c) Use Lagrange's formula to fit a polynomial to the data:  

x :	-1	0	2	3
y :	-8	3	1	12
- (d) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Simpson's  $\frac{3}{8}$  rule taking  $h = \frac{1}{6}$ .
- (e) Compute  $y(0.2)$  by Taylor's series method if  $y' = x^2y - 1$ ,  $y(0) = 1$ .
- (f) Four coins are tossed. What is the expectation of the number of heads?
- (g) A certain screw making machine produces an average of 2 defective screws out of 100, and packs them in boxes of 500. Find the probability that a box contains 15 defective screws.
- (h) Define random variable and explain 2 types of random variables.
- (i) A random sample is taken from a normal population with mean 30 and standard deviation 4. How large a sample should be taken if, sample mean lies between 25 and 35 with probability 0.98?
- (j) A random sample of size 18 is taken from a normal population. Test the hypothesis  $H_0: \sigma^2 = 0.36$  against  $H_1: \sigma^2 > 0.36$  given  $s^2 = 0.68$ ,  $\alpha = 5\%$

### PART B

(4 × 10 = 40)

- II. (a) Find the real root of the equation  $xe^x - 3 = 0$  by Regula Falsi method, correct to 3 decimal places.
- (b) Determine  $\log_{10} 1044$  from the data below

x :	1000	1010	1020	1030	1040	1050
$\log_{10} x$ :	3	3.0043	3.0086	3.0128	3.0170	3.0212

OR

(P.T.O.)

- III. (a) Using Gauss Seidal iteration method solve  
 $27x + 6y - z = 15$ ,  $6x + 15y + 2z = 72$ ,  $x + y + 54z = 110$ .
- (b) Apply Stirling's formula to find  $f(0.41)$  if  
 $f(0.30) = 0.1179$ ,  $f(0.35) = 0.1368$ ,  $f(0.40) = 0.1554$ ,  
 $f(0.45) = 0.1736$ ,  $f(0.50) = 0.1915$ .
- IV. (a) Find the first and second derivatives of the function tabulated below at the point  
 $x = 1.5$  and  $x = 4$ .
- |          |       |   |        |    |        |    |
|----------|-------|---|--------|----|--------|----|
| $x$ :    | 1.5   | 2 | 2.5    | 3  | 3.5    | 4  |
| $f(x)$ : | 3.375 | 7 | 13.625 | 24 | 38.875 | 59 |
- (b) Using modified Euler method, find  $y(0.1)$  and  $y(0.2)$ , given  
 $y' = x^2 + y^2$ ,  $y(0) = 1$ .

OR

- V. (a) Given  $\frac{dy}{dx} = x^3 + y$ ,  $y(0) = 1$ . Compute  $y(0.04)$  using Euler's method by  
taking  $h = 0.01$ .
- (b) Given  $y' = x^2 - y$ ,  $y(0) = 1$ . Find  $y(0.1)$  and  $y(0.2)$  using R-K method of  
fourth order.
- VI. (a) Find the mean and variance of binomial distribution.
- (b) In a test on 2000 electric bulbs, it was found that the life of a particular make,  
was normally distributed with an average life of 2040 hours and S.D. of 60  
hours. Estimate the number of bulbs likely to burn for (i) more than 2150 hours  
(ii) less than 1950 hours (iii) more than 1920 hours and but less than 2160  
hours.

OR

- VII. (a) Fit a second degree parabola to the following data:
- |       |   |     |     |     |     |
|-------|---|-----|-----|-----|-----|
| $x$ : | 0 | 1   | 2   | 3   | 4   |
| $y$ : | 1 | 1.8 | 1.3 | 2.5 | 6.3 |
- (b) In a normal distribution 31% of the items are under 45 and 8% are over 64.  
Find the mean and S.D of the distribution.
- VIII. (a) A population follows normal distribution with mean  $\mu$  and variance 9. To test  
 $H_0: \mu = 5$  against  $\mu = 7$  the test procedure suggested is to reject  $H_0$  if  $\bar{x} \geq 6$   
where  $\bar{x}$  is the mean of a sample of size 16. Find the significance level and the  
power of the test.
- (b) Mice with average life span of 32 months will live up to 40 months when fed by  
a certain nutritious food. If 64 mice fed on this diet have an average life span of  
38 months and S.D of 5.8 months, is there any reason to believe that average life  
span is less than 40 months.

OR

- IX. (a) Define (i) Type I error (ii) Type II error (iii) Significance level (iv) Critical  
region.
- (b) Two independent sample of sizes 7 and 6 had the following values:
- |            |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|
| Sample A : | 28 | 30 | 32 | 33 | 31 | 29 | 34 |
| Sample B : | 29 | 30 | 30 | 24 | 27 | 28 |    |
- Examine whether the samples have been drawn from normal populations having  
the same variance.