

--	--	--	--	--	--	--	--

B.Tech. Degree V Semester Supplementary Examination
April 2019

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) Express $f(x) = 2x^3 - 3x^2 + 3x - 10$ in factorial notation and hence find $\Delta^3 y$
- (b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\frac{3}{8}$ rule taking $h = \frac{1}{6}$.
- (c) Use Lagrange's formula to fit a polynomial to the data
- | | | | | |
|-------|----|---|---|----|
| $x :$ | -1 | 0 | 2 | 3 |
| $y :$ | -8 | 3 | 1 | 12 |
- (d) Solve $y' = y^3 + x, y(0) = 1$ using Taylor's series method and compute $y(0.1)$ and $y(0.2)$
- (e) Solve by Euler's method $\frac{dy}{dx} = y - x : y(0) = 2$ find $y(0.2)$
- (f) Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them.
- (g) Obtain the mean of the binomial distribution.
- (h) Define (i) level of significance (ii) Power of the test.
- (i) If X follows Poisson distribution with $P(X = 2) = \frac{2}{3} P(X = 1)$, then find $P(X = 3)$
- (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) Using Gauss Seidal iteration method solve $27x + 6y - z = 15, 6x + 15y + 2z = 72, x + y + 54z = 110$.
- (b) From the following table of half yearly premium for policies maturing at different ages, estimate the premium for policies maturing at ages 46 and 63
- | | | | | | |
|-------------|------|-----|-----|-----|-----|
| Age (x) | 45 | 50 | 55 | 60 | 65 |
| Premium (Y) | 1150 | 960 | 830 | 740 | 680 |

OR

- III. (a) Using Newton's divided difference formula find $f(7)$ if $f(3) = 24, f(5) = 120, f(8) = 504, f(9) = 720$ and $f(12) = 1716$.

(P.T.O.)

- (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) Estimate $f(8)$ from the following data

X:	4	5	7	10	11	13
Y:	48	100	294	900	1210	2028

- (b) From the following table find the value of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.6$

X:	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y:	7.989	8.403	8.781	9.129	9.451	9.750	10.031

OR

- V. (a) Given $\frac{dy}{dx} = x^3 + y$ where $y(0) = 1$ compute $y(0.04)$ using modified 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) Fit a binomial distribution to the following data and compares the theoretical frequencies with the actual one

x:	0	1	2	3	4	5
f :	2	14	20	34	22	8

- (b) Show that the binomial distribution tends to poisson distribution with $n \rightarrow \infty, p \rightarrow 0$ such that np is finite

OR

- VII. (a) A company claims that the mean life of its bulbs produced is 1600 hours .A random sample of 100 bulbs gave a mean life of 1570 hours with a SD 120 hours .Test the claim at 5% level.
 (b) The SD of a sample of size 15 from a normal population was found to be 7. Examine whether the hypothesis is that the SD is 7.6 is acceptable.

- VIII. (a) Find the 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 SD 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 but less than 2160 hours.

OR

- IX. (a) Define (i) Type I error (ii) Type II error (iii) critical region
 (b) Two independent samples of sizes 7 and 6 has 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 population having same variance
