B.Tech. Degree V Semester Special Supplementary Examination June 2013

IT/CS/CE/ME/SE/EE/EC/EI/EB/FT 501 ENGINEERING MATHEMATICS IV

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer ***ALL*** questions)

(8 × 5 = 40)

I. (a) Let X be the number on a die when thrown. Find the mean and variance of X.

(b) In a binomial distribution consisting of 5 independent trials first and second terms are 0.4096 and 0.2048 respectively. Find the parameter P.

(c) A random sample of 900 items with mean 3.5 is drawn from a population with standard deviation 2.61. Calculate the 95% confidence interval for the mean μ of the population.

(d) Define:
- (i) Null and alternate hypothesis
- (ii) Type I and Type II error
- (iii) Power of a test

(e) Express $f(x)=x^3-3x^2+5x+7$ in terms of factorial polynomial taking h = 2 and find its differences.

(f) From the following table find the missing value.

x:	2	3	4	5	6
y:	45.0	49.2	54.1	–	67.4

(g) Using Taylor series method, find correct to 4 decimal places, the value of $y(0.1)$, given $\frac{dy}{dx}=x^2+y^2$, $y(0)=1$.

(h) Using Euler's method find $y(0.1)$ from the differential equation $\frac{dy}{dx}=x+y$, $y(0)=1$ taking h = 0.02.

PART B

(4 × 15 = 60)

II. (a) Obtain Poisson distribution as a limiting case of binomial distribution. Also find the mean and variance of Poisson distribution.

(b) The table given below shows the number of students who have passed 4 tests in examination. Fit a binomial distribution to the data

Number of tests passed :	0	1	2	3	4
Frequency :	4	10	15	9	2

OR

III. (a) In a competitive examination 5000 students have appeared for a paper in Statistics. Their average marks was 62 and standard deviation 12. If there are only 100 vacancies find the minimum marks that one should score inorder to get selected (Assume normal distribution).

(b) Calculate the coefficient of correlation between X and Y from the following data:

X:	218	220	236	225	220	227	228
Y:	12.3	12.7	12	12.2	12.7	12.1	12

(P.T.O.)

IV. (a) A random sample of size 9 from $N(8, \sigma^2)$ yield the values 8.6, 7.9, 8.3, 6.4, 8.4, 9.8, 7.2, 7.8, 7.5. Construct a 90% confidence interval for σ^2.

(b) For a sample of 100 labourers from Kerala, the average daily wages is ₹10.50 with standard deviation ₹1.50. For a sample of 150 labourers from Tamil Nadu the corresponding figures are ₹8.00 and ₹1.00 respectively. Can you conclude that the average wages of workers in Kerala are more than that of workers in Tamil Nadu?

OR

V. (a) The average life of 26 electric bulbs were found to be 1200 hours with a standard deviation of 150 hours. Test whether these bulbs could be considered as a random sample from a normal population with mean 1300 hours.

(b) Two samples are drawn from 2 normal populations. From the following data test whether the 2 samples have the same variance at 5% level of significance.

Sample I :	60	65	71	74	76	82	85	87		
Sample II :	61	66	67	85	78	63	85	86	88	91

VI. (a) The population of a town in the census is given below. Estimate the population in the year 1895.

Year	:	1891	1901	1911	1921	1931
Population (in thousands)	:	46	66	81	93	101

(b) Using Lagrange interpolation find the value of y when $x = 9.5$ from the following data.

x:	7	8	9	10
y:	3	1	1	9

OR

VII. (a) Find the first and second derivative of y at $x = 1$ from the following gdata.

x:	1	3	5	7	11
y:	40.62	60.8	79.95	103.56	132.65

(b) Evaluate $\int_0^1 \frac{1}{1+x}dx$ taking $h = 0.25$ using (i) trapezoidal rule (ii) Simpson's one-third rule.

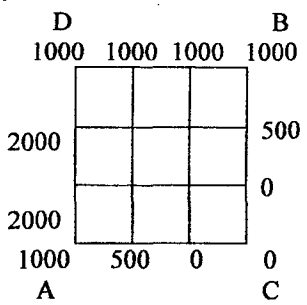
VIII. (a) Using Runge Kutta method find $y(0.2)$ for the differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ taking $h = 0.2$.

(b) Solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial t} = 0$ given $u(0,t) = 0$, $u(4,t) = 0$.

OR

IX. (a) Using modified Euler's method find $y(0.1)$ and $y(0.2)$, given $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$.

(b) Evaluate the function $u(x,y)$ satisfying $\nabla^2 u = 0$ at the lattice points given the boundary values as follows.



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