BTS.V-11.14-0840 Reg.No. [ ]

A

B.Tech. Degree V Semester Examination November 2014

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

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) Obtain the distribution function and mean of the total number of heads occurring in three tosses of an unbiased coin.

(b) A random variable X has density function $P(x) = \frac{1}{\pi\left(1+x^2\right)}, -\infty < x < \infty$.

Find the probability that x^2 lies between $\frac{1}{3}$ & 1.

(c) Determine the coefficient of correlation between X and Y for the two regression lines 3x+2y=26 and 6x+y=31.

(d) A sample of 900 members is found to have a mean of 3.4 cm. Can it be reasonably regarded as a random variable from a large population with mean 3.25cm and S.D 1.61cm.

(e) Prove that $1+\mu^2\delta^2 = \left[1+\frac{\delta^2}{2}\right]^2$.

(f) Apply Lagrange's formula to evaluate $f(1)$ from the following data

x:	-1	0	2	3
$f(x)=y$:	-8	3	1	12

(g) Evaluate $\int_4^{5.2} \log x dx$ using Sinpson's $\frac{1}{3}^{rd}$ rule taking $h = 0.2$

(h) Solve by Euler's method, $\frac{dy}{dx} = x + y$; $y(0) = 1$.
Find $y(0.2)$, $y(0.4)$ and $y(0.6)$

PART B

(4 x 15 = 60)

II. (a) Derive the mean and variance of Poisson distribution.

(b) In a normal distribution 17% of the items are below 30 and 17% of the items are above 60. Find the mean and standard deviation.

OR

III. (a) Fit a curve of the form $y = ae^{bx}$ to the following data by the method of least squares

x :	0	5	8	12	20
y :	3	1.5	1	0.55	0.18

(b) Derive the mean and variance of binomial distribution.

(P.T.O.)

IV. (a) Define (i) significance level (ii) type I & II errors (iii) point estimation in sampling theory.

(b) A machine is supposed to produce washers of mean thickness of 0.12cm. A sample of 10 washers was found to have mean thickness of 0.12cm and S.D 0.008. Test whether the machine is working in proper order at 5% of significance level.

OR

V. (a) A random sample of size 15 is taken from $N(\mu, \sigma^2)$ has $\bar{X} = 3.2$ and $S^2 = 4.24$. Obtain a 90% confidence interval for σ^2.

(b) The mean of simple random samples of sizes 1000 and 2000 are 67.5 and 68 cm respectively. Can the samples be regarded as drawn from same population of S.D 2.5cm.

VI. (a) Represent $x^4 - 12x^3 + 42x^2 - 30x + 9$ and its successive forward difference in factorial polynomials taking h = 1.

(b) Prove that $\left(\frac{\Delta^2}{E}\right)e^x, \frac{Ee^x}{\Delta^2 e^x} = e^x$, taking h as the interval of differencing.

OR

VII. (a) Use Lagrange's interpolation formula to fit a polynomial to the data

x	:	0	1	3	4
y	:	-12	0	6	12

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\frac{3}{8}$ rule taking $h = \frac{1}{6}$

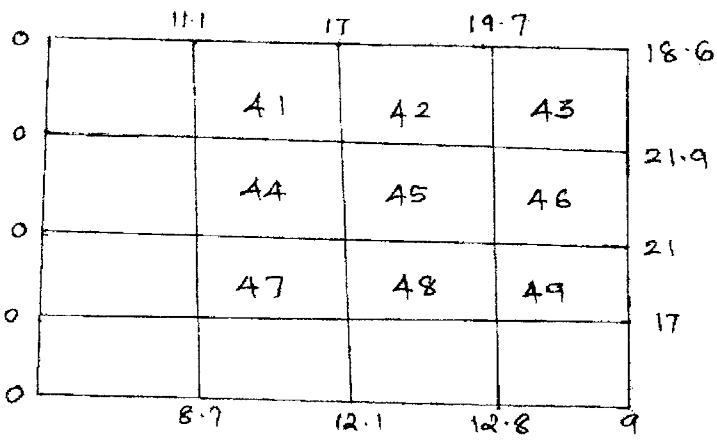
VIII. (a) Apply Runge-kutta fourth order formula to evaluate y(0.1) where $\frac{dy}{dx} = x^2 + y^2$; $y(0) = 1$

(b) Apply Newton's divided difference formula to evaluate $f(2)$ from the following table

x	:	4	5	7	10	11	13
f(x)	:	48	100	294	900	1210	2028

OR

IX. Solve the Laplace equation.



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