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Total number of printed pages – 3

B. Tech  
BSCM 1210

## Special Examination – 2012

### MATHEMATICS -- IV

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

- (a) Define Truncation error, approximate error, relative error, percentage relative error.
- (b) Explain the rate of convergence of Newton-Raphson method.
- (c) What do you mean by ill conditioning of a system of equation ?
- (d) Find  $f[1, 2, 3]$  of the following data :

x	0	1	2	3
y	1	3	9	27

- (e) Write the error in Simpson's 1/3 method in numerical integration ?
- (f) What is the difference between Euler's method and Modified Euler's method?
- (g) Write the characteristics of normal distribution.
- (h) Write the steps to find the confidence interval for  $\mu$  (mean) of the normal distribution when  $\sigma^2$  (variance) is unknown.
- (i) Why regression analysis is used in data analysis ?
- (j) Write the conditions for using chi-square test.

P.T.O.

2. (a) Find the square root of 8 using Newton-Raphson method. 5  
 (b) Using Secant method find a real root of  $x^3 + x^2 - 3x - 5 = 0$  correct upto three decimal places. 5
3. (a) Find the interpolating polynomial of the following data using Newton Divide Difference method 6

x	1	2	5	9	10
f(x)	5	7	8	12	14

Also find  $f(6)$ .

- (b) Solve the following system of equations using Gauss Seidel method 4

$$4x + y + 2z = 4$$

$$3x + 5y + z = 7$$

$$x + y + 3z = 3$$

4. (a) The following values of the function  $f(x)$  are given 5

x	$10^0$	$20^0$	$30^0$	$40^0$
f(x)	1.1585	1.2817	1.3660	1.446

Construct the interpolating polynomial that fits the data using any suitable method. Hence find  $f(\pi/12)$ . 5

- (b) Using Simpson's 1/3 rule, evaluate  $\int_1^5 \log_{10} x dx$  taking  $h = 0.5$
5. (a) Find  $y(0.4)$  using Euler's modified method of the initial value problem 5  
 $y' = x + y^2$ ,  $y(0) = 1$ .
- (b) If the probability that a man aged 60 will live to be 70 is 0.65, what is the probability that out of 10 men now 60, at least 7 will live up to 70. 5
6. (a) A car hire firm has two cars, which it hires out day by day. The number of demands for each car on each day is distributed as a poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused. 5

- (b) In a normal distribution exactly 7% of the items are under 35 and 89% of the items are under 63. What are the values of the mean and standard deviation of the distribution? 5
7. (a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from the population with mean 38. Also calculate 95% confidence interval for the population mean. 5
- (b) Among 64 offsprings of a certain cross between guinea pigs, 32 were red, 10 were black and 22 were white. According to the genetic model, these numbers should be in the ratio 9:3:4. Are the data consistent with the model at 5% level of significance? 5
8. (a) From the following data, fit two regression equations : 5

$\bar{x}$	1	2	3	4	5	6	7
F(x)	2	4	7	6	5	6	5

- (b) In a partially destroyed Lab record, only the lines of regression of y on x and x on y are available as  $4x - 5y + 33 = 0$  and  $20x - 9y - 107 = 0$  respectively. Calculate  $\bar{x}$ ,  $\bar{y}$  and the co-efficient of correlation between x and y. 5