

Code: CE3T1

**II B.Tech - I Semester – Regular Examinations - January 2014****MATHEMATICAL METHODS  
(CIVIL ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Find a positive root of the equation  $x^3 - 4x - 9 = 0$  using bisection method in four stages. 7 M

b) Using Newton-Raphson method, find a positive root of  $x^4 - x - 9 = 0$  7 M

2. a) Using Gauss Backward difference formula, find  $y(8)$  from the following table 7 M

x	0	5	10	15	20	25
y	7	11	14	18	24	32

b) Given  $U_1 = 22, U_2 = 30, U_4 = 82, U_7 = 106, U_8 = 206$ , find  $U_6$ . Use Lagrange's interpolation formula. 7 M

3. a) Find the first and second derivative of the function tabulated below at  $x = 0.6$  7 M

x	0.4	0.5	0.6	0.7	0.8
y	1.5836	1.7974	2.0442	2.3275	2.6511

b) Evaluate  $\int_0^1 \frac{1}{1+x} dx$

i) by Trapezoidal rule and

ii) Using Simpson's  $\frac{3}{8}$  rule.

7 M

4. Solve  $y' = x-y$  given that  $y(1) = 0.4$  Find  $y(1.2)$  using Runge-Kutta method. 14 M

5. a) A card is drawn from a well shuffled pack of cards. What is the probability that it is either a spade or an ace. 7 M

b) In a bolt factory machines A, B, C manufacture 20%,30%, and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A

(ii) Machine B

(iii) Machine C.

7 M

6. a) Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are

(i) at least one

(ii) at most one

7 M

b) Fit a poisson distribution for the following data and calculate the expected frequencies

7 M

x	0	1	2	3	4	5	6	7	8
f	56	156	132	92	37	22	4	0	1

7. a) In six determination of the melting point of tin, a chemist obtained a mean of 232.26 degrees Celsius with a standard deviation of 0.14 degrees if he uses this mean to estimate the actual melting point of tin, what can the chemist assert with 98% confidence about the maximum error? 7 M
- b) A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of  $n_1 = 40$  of its bulbs has a mean lifetime of 647 hours of continuous use with a standard deviation of 27 hours, while a sample of  $n_2 = 40$  bulbs made by its main competitor had a mean life time of 638 hours of continuous use with a S standard deviation of 31 hours, does this substantiate the claim at the 5% level of significance. 7 M
8. a) Explain one-tailed and two- tailed tests. 7 M
- b) In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance? 7 M