Code: CE3T1

II B.Tech - I Semester – Regular/Supplementary Examinations
November - 2018

MATHEMATICAL METHODS
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Evaluate $\Delta^2\left(ab^x\right)$, interval of differencing being unity.

b) What is the iterative formula to find, square root of a number, $\sqrt{N}$ using Newton- Raphson method.

c) Using Euler's method, solve for y at x=0.2 from $y' = x + y,\ \mathrm{y}\left(0\right) = 1$.

d) Write the formula for Picard's method of successive approximations.

e) Define conditional event.

f) A fair coin is tossed six times. Find the probability of getting four heads.

g) The probability density $f(x)$ of a continuous random variable is given by $f(x) = \begin{cases} kx^3, & \text{if } 0<\mathrm{x}<1 \\ 0, & \text{otherwise} \end{cases}$ then find k.

h) What is the value of correction factor if n=5 and N=200.

i) If $\sigma = 48hrs$, maximum error $E = 10hrs$, then how large a sample be needed so that one will be able to assert with 90% confidence.

j) Define Null hypothesis.

k) A sample of 64 students with mean weight of 70kgs can this be regarded as a sample from a population with mean weight 56kgs and standard deviation is 25kgs.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Find the real root of the equation $3x = \cos x + 1$, using the Regula Falsi method 8 M

b) Apply Lagrange's formula to find *f(5)*. Given that *f(1)=-3, f(3)=9, f(4)=30, f(6)=132* 8 M

3. a) Solve $\frac{dy}{dx} = x + y^2$, given $y(0) = 1$. Find $y(0.1)$, $y(0.2)$ by Taylor's Series method. 8 M

b) Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$, given that $y' = x + y$, $y(0) = 1$. 8 M

4. a) In an examination 7% of students score less than 35% marks and 89% of students score less than 60% marks. Find the mean and standard deviation if the marks are normally distributed. 8 M

b) A random variable X has the following probability function 8 M

X	0	1	2	3	4	5	6	7
P(X=x)	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

Find: (i) k (ii) $P(X<6)$ (iii) $P(X\geq 6)$ (iv) $P(0<X<5)$

5. a) The mean voltage of a battery is 15 and S.D is 0.2 Find the probability that four such batteries connected in series will have a combined voltage of 60.8 or more volts. 6 M

b) A population consists of five numbers 3,6,9,15,27. Consider all possible samples of size 2 that can be drawn with out replacement from this population. Find 10M

(i) The mean of the population.
(ii) The standard deviation of the population.
(iii) The mean of the sampling distribution of means and
(iv) The standard deviation of the sampling distribution of means.

6. a) The average income of person from city A was Rs. 210/- with a standard deviation of Rs. 10/- in a sample of 100 people. For another sample of size 150 from city B, the average income of person was Rs. 200/- with a standard

deviation of Rs. 12/- . Test whether there is any significant difference between the average income between city A and city B persons. $(\alpha = 0.05)$ 8 M

b) A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty. Test his claim at 5% level of significance. 8 M