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Total Number of Pages : 02

B.Tech  
BSCM1210

**4<sup>th</sup> Semester Back Examination 2018-19**  
**MATHEMATICS- IV**  
**BRANCH: AERO, AUTO, BIOMED, CHEM,**  
**CIVIL, ENV, FASHION, FAT, MANUFAC, MANUTECH,**  
**MARINE, MECH, METTA, MME, PE, PLASTIC, TEXTILE**

Time : 3 Hours

Max Marks : 70

Q.CODE : F1009

**Answer Question No.1 which is compulsory and any five from the rest.**  
**The figures in the right-hand margin indicate marks.**

**Q1 Answer the following questions : (2 x 10)**

- a) Round-off the number 6.5126 to four significant figures and write the relative percentage error.
- b) What is Truncation error?
- c) Write using Lagrange interpolation how many nodes or arguments are required to obtain a polynomial of degree 10.
- d) Let  $\frac{dy}{dx} = -2xy$ ,  $y(0) = 1$  with step size  $h = 0.2$  then by Euler's method find the value of  $y(0.4)$  ?
- e) A continuous random variable  $X$  has probability distribution  $f(x) = \begin{cases} k(1-x), & \text{for } 0 < x < 1 \\ 0, & \text{Elsewhere} \end{cases}$  what is the value of  $k$ .
- f) Define Linear Interpolation.
- g) Define Type-1 and Type-2 error in sampling distribution.
- h) State two differences between Binomial and Poisson distribution.
- i) Write down the range of correlation coefficient.
- j) We want to draw random samples of two gaskets from a lot of 10 gaskets out of which 3 gaskets are defective. Then find the probability function of the random variable  $X$  = Number of defective in the sample, if we perform the operation without replacement.

- Q2 a) Using Bisection method formulate the real root of the equation  $x^3 - x - 1 = 0$  (5)**  
**b) Using Newton-Raphson method formulate the real roots of the equation (up to three iterations)  $x^2 - 5x + 3 = 0$  (5)**

- Q3 a) Calculate mean and variance for a continuous random variable  $x$  with probability density (5)**

$$f(x) = \begin{cases} \frac{3}{2}(1-x^2), & \text{for } 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$$

- b) Calculate probability distribution function for a continuous random variable  $x$  with probability density (5)**

$$f(x) = \begin{cases} \frac{3}{2}(1-x^2), & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

- Q4 a)** Evaluate  $f(1.2)$  by using Newton's forward difference interpolation formula for given tabulated values. **(5)**

<b>x</b>	0	1	2	3	4
<b>f(x)</b>	1	1.5	2.2	3.1	4.3

- b)** Formulate  $f(1.5)$  for given tabulated points. **(5)**

<b>x</b>	0	1	3	4
<b>f(x)</b>	-12	0	6	12

- Q5 a)** Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y) **(5)**

<b>x</b>	65	66	67	68	69	70	71	72
<b>y</b>	67	68	65	68	72	72	69	71

- b)** Calculate the mean and standard deviation of the sampling distribution of mean of 300 random samples of size  $n = 36$  are drawn from a population of  $N = 1500$  which is normally distributed with mean  $\mu = 22.4$  and standard deviation  $\sigma = 0.048$ , if sampling is done (a) with replacement (b) without replacement **(5)**

- Q6** Evaluate a parabola  $y = ax^2 + bx + c$  in least square sense to the following data **(10)**

<b>x</b>	10	12	15	23	20
<b>Y</b>	14	17	23	25	21

- Q7** Evaluate  $y(1.3)$  by using Runge-Kutta method of order 4 for initial value problem **(10)**  
 $\frac{dy}{dx} = x^2 + y^2, y(1) = 0$  by taking  $h = 0.1$ .

- Q8 Write short answer on any TWO :** **(5 x 2)**

- a)** Show that, in Binomial distribution variance is greater than mean.
- b)** Write down the methodology involved in finding the roots of equation numerically.
- c)** Write down the characteristics of Normal distribution.