	of Questions : 9]	SE.	AT No. :
PB363	<sup>30</sup> [6261]-3	<b>35</b>	[Total No. of Pages : 5
S.E. (Co	omputer/I.T./Computer Science	& Design Eng	gineering/AI & ML)
	ENGINEERINGMATI		
	(2019 Pattern) (Semest	er - IV) (207	(003)
Time : 21/2	2 Hours]		[Max. Marks : 70
	ons to the candidates:		
	Q.1 is computsory.  Attempt Q 2 or Q.3, Q.4 or Q.5, Q.6 or Q.5.	0.7, 0.8 or 0.9.	
<i>3</i> )	Neat diagrams must be drawn wherever	necessary. 🍶 🧻	7
	Figures to the right indicate full marks. Use of electronic pocket calculator is al	and the second s	9
	Assume suitable data, if necessary.		
	6.	O	ين ا
O1)Write	e the correct option for the following	multiple choic	re questions
Q1) WIII	the correct option for the following	induspic choic	e questions.
a) N	The first three moments of a distri	bution about th	ne value 5 are 2,20 and
	40. Third moment about the mean	, , , , , , , , , , , , , , , , , , ,	[2]
	i) - 64 iii) 32	ii) 64 iv) -32	
	iii) 32	32	
b)	If probability density function $f(x)$	of a continuou	as random variable <i>x</i> is
	$\frac{1}{2} - 2 \leq \alpha \leq 2$		
	defined by $f(x) = \begin{cases} -2 & \text{s.t.} \leq 2 \\ 0, & \text{otherwise} \end{cases}$		[2]
	then $P(x \le 1)$ is		
	189.	1	
	i) 1/4	ii) $\frac{1}{2}$	2 %
	1	2	(S) (S).
	iii) $\frac{1}{3}$	iv) $\frac{3}{4}$	3 8
			1.00
c)	Using secant method, the first appro		
6	$x^3 - 5x - 7 = 0$ , if the initi	al approxim	7
-)	$x_0 = 2.5 \text{ and } x_1 = 3 \text{ is}$ i) 2.7183	ii) 3	[2]
	iii) 2	iv) 0	
	ш) 2	14)	

*P.T.O.* 

d)	If Lagrange's	s polynomial	nasses	through
u)	II Lagrange s	s porymonnai	passes	unpugn

х	0	1
у	-4	-4

then  $\frac{dy}{dx}$  at x = 1 is given by

i)

ii)

iii)

## To compare the variability of two or more than two series, coefficient of e) variation is obtained using $(\bar{x})$ is arithmetic mean and $\sigma$ is standard deviation) [1]

f) If 
$$x_0$$
 is initial approximation to the root of the equation  $f(x) = 0$  by Newton - Raphson method, first approximation  $x_1$  is given by [1]

- iv)  $x_1 = x_0 \frac{f(x_0)}{f'(x_0)}$  iv)  $x_1 = x_0 + \frac{f'(x_0)}{f(x_0)}$

## Find arithmetic mean and coefficient of variation for x if the data is, **Q2**) a)

$$\begin{vmatrix} x & 1 & 2 & 3 & 4 \\ f & 9 & 6 & 5 & 3 \end{vmatrix}$$

[5]

[2]

b) Fit a straight line of the form 
$$y = ax + b$$
 for the data  $\begin{vmatrix} x & -2 & -1 & 0 & 1 & 2 \\ y & 5 & 3 & 1 & -1 & -3 \end{vmatrix}$ . [5]

Given the information:  $\overline{x} = 8.2$ ,  $\overline{y} = 12.4$ ,  $\sigma_x = 6.2$ ,  $\sigma_y = 20$   $\gamma(x, y) = 0.9$ . Find line of regression of x on y. Estimate x for y = 10[5]

OR

- Q3) a) The first four moments of a distribution about the value 2 are 2, 10, 20 and 25. Find first four moments about mean, coefficient of skewness and kurtosis.
  - b) Fit a parabola of the type  $y = ax^2 + bx + c$  for the data  $\begin{vmatrix} x & -1 & 0 & 1 & 2 \\ y & 3 & 1 & 3 & 9 \end{vmatrix}$  [5]
  - c) Find the coefficient of correlation for following distribution,

$$\begin{vmatrix} x & 5 & 7 & 9 & 11 & 13 \\ y & 9 & 6 & 12 & 3 & 15 \end{vmatrix}$$
 [5]

- Q4) a) A box contains 6 red balls, 4 white balls and 5 blue balls. Three balls are drawn successively from the box. Find the probability that they are drawn in the order red, white and blue if each ball is not replaced.
  [5]
  - b) A coin is so biased that appearence of head is twice likely as that of tail. If a throw is made 6 times, using Binomial distribution, find the probability that at least two heads will appear. [5]
  - In a distribution, exactly normal, 7% of the items are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution. [Given A(z = 1.48) = 0.43 A(z = 1.23) = 0.39] [5]

OR

- Q5) a) The average number of misprints per page of a book is 1.5. Assuming the distribution of number of misprints to be poisson, find the number of pages containing more than one misprint if the book contains 900 pages. [5]
  - b) A random sample of 200 screws is drawn from a population which represents the size of screws. If a sample is distributed normally with mean 3.15 cm and standard deviation 0.025cm, find expected number of screws whose size falls between 3.12 cm and 3.2 cm. [5]

[Given 
$$A(z = 1.2) = 0.3849$$
,  $A(z = 2) = 0.4772$ ]

A nationalised bank utilizes four teller windows to render fast service to the customers. On a particular day, 800 customers were observed. They were given service at the different windows as follows. [5]

Window number	Expected no.of customers
1	150
2	250
3	170
4	230

Test whether the customers are uniformly distributed over the windows at 5% level of significance.

[Given  $\chi^2_{3,0.05} = 7.815$ ]

- Q6) a) Using the Bisection method up to fifth iteration, find a real root of the equation  $x^3 4x 9 = 0$ . [5]
  - b) Find the real root of the equation  $2x^3 2x 5 = 0$  by applying Newton Raphson method at the end of fourth iteration. [5]
  - c) Solve by Gauss Seidel method, the system of equations: [5]

$$45x_1 + 2x_2 + 3x_3 = 58$$

$$-3x_1 + 22x_2 + 2x_3 = 47$$

$$5x_1 + x_2 + 20x_3 = 67$$

OR

Q7) a) Solve the following system by Cholesky's method:

$$4x_1 + 2x_2 + 14x_3 = 145$$

$$2x_1 + 17x_2 - 5x_3 = -101$$

$$14x_1 - 5x_2 + 83x_3 = 155$$

b) Solve the following system by Gauss elimination method: [5]

$$2x_1 - 2x_2 + 3x_3 = 2$$
$$x_1 + 2x_2 - x_3 = 3$$
$$3x_1 - x_2 + 2x_3 = 1$$

c) Use method of false position to find the fourth root of 32 correct to three decimal places. [5]

Q8) a) Using Newton's forward interpolation formula, find the polynomial satisfying the data. [5]

х	0	1	2	3	4
у	-4	-4	0	14	44

- b) Use simpson's  $\frac{1}{3}$  rd rule to obtain  $\int_{1}^{2} \frac{1}{x} dx$  dividing the interval into four parts. [5]
- c) Use Euler's method to solve  $\frac{dy}{dx} = \frac{x y}{2}$ , y(0) = 1. Tabulate values of y for y = 0 to x = 2. Take h =0.5. [5]

OR

- **Q9**) a) Use Runge Kutta method of fourth order to solve  $\frac{dy}{dx} = x^2 + y^2; \ x_0 = 1, \ y_0 = 1.5 \text{ of ind y at } x = 1.1 \text{ taking h} = 0.1$  [5]
  - b) Using modified Euler's method, find y(0.1) given that  $\frac{dy}{dx} = 1 + xy$ ; y(0) = 1 and h = 0.1. Consider accuracy to four decimal places. [5]
  - Using Newton's backward interpolation formula, find the polynomial satisfying the data. Also, find y when x = 4.5. [5]

X	1	2	3	) ·4	5
y	14	30	62	116	198

\* \* \*