Roll No:

B. TECH (SEM-III) THEORY EXAMINATION 2019-20 MATHEMATICS-IV

Time: 3 Hours

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

Q no.	Question	Marks	CO
a.	Solve the following partial differential equation $yq - xp = z$.	2	1
b.	Solve the Cauchy's problem $u_x - u_y = 0$. $u(x, 0) = x$	2	1
c.	Classify the following equation. $x^2 \frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial x^2} = u$	2	2
d.	Solve the partial differential equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} = 0.$	2	2
e.	Find the median of 6,8,9,10,11,12.13.	2	3
f.	The first three central moments of a distribution are 0,15,-31. Find the moment of coefficient of skewness.	2	3
g.	If the p.m.f of a discrete random variable X is $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2	4
h.	The probability density function $f(x)$ of a continuous random variable X is defined by $f(x) = \begin{bmatrix} \frac{A}{x^2}, & 5 \le x \le 10 \\ 0, & \text{otherwise} \end{bmatrix}$ Find the value of A.	2	4
i.	Find the mean of the Binomial Distribution $B(4, \frac{1}{3})$.	2	4
j.	A machine which produces mica insulating washers for use in electric device to turn out washers having a thickness of 10 mm. A sample of 10 washers hasan average thickness 9.52 mm with a standard deviation of 0.6 mm. Find out t.	2	5

SECTION B

2. Attempt any *three* of the following:

$3 \times 10 = 30$

Q no.	Question	Marks	CO
a.	Solve $(D^2 - DD' - 2D'^2)z = (y - 1)e^x$	10	1
b.	A rectangular plate with insulated surface is 10 cm wide and so long compared to its width that it may be considered infinite in length without introducing an appreciable error. If the temperature along the short edge y=0 is given by: $u(x,0)=20x\ 0\le x\le 5$ $20\ (10-x)\ 5\le x\le 10$ While the two edges x=0 and x=10 as well as the other short edge are kept at 0°C. Find the steady state temperature at any point (x,y) of the plate.	10	2

Total Marks: 100

 $2 \times 10 = 20$

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с.	Find an exponent	tial curve PV^{γ}	= k for the formula $k = k$ formula	he data	a:							10	3
			200										
		100 150	200										
	P 135	48 26	17										
d.	Fit a Poisson dist	ribution to the	e following	g data	whic	h give	the m	umber	of	yeast	cells	s 10	4
	per square for 40	<u> </u>	- <u>1</u>	1		1	1	1	-				
	X 0 1	2 3	4 5	6	7	8	9	10					
	F 103 14		8 4	2	0	0	0	0					
	It is given that e ⁻¹												
e.	To test the effect	tiveness of ir	noculation	again	st ch	olera	, the f	follow	ing	table	e was	s 10	5
	obtained								7				
	T 1 1	Attached		attach	ed	Tota	al		_				
	Inoculated	30	160			190			-				
	Not inoculated		460			600			-				
	Total (The figure repre	170	620	(ana)		790)						
	Use Chi square		1		state	ment	The i	nocula	ntior	n nre	vento	2	
	attack from chole									-		,	
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2	• • • •					P				- 44		0	N
3.	Attempt any one	part of the fo	llowing:		~	イ			1	x 1() = 1		
Q no.			Qu	estion	~.X							Marks	CO

Q no	. Question	Marks	CO
a.	Solve $(D + 1)(D + D' - 1)z = \sin(2x + 3y)$	10	1
b.	In a partial destroyed laboratory record of an analysis of correlation data, the following result only are legible : Variance of x = 9 Regression equation: 8x-10y + 66 = 0, 40x -18y = 214. What were (a) the mean value of x and y (b) the standard deviation of y and the co-efficient of correlation between x and y?	10	3

4. Attempt any *one* part of the following:

$1 \ge 10 = 10$

Q no.	Question	Marks	CO
a.	Solve $x^2 \frac{\partial^2 z}{\partial x^2} - 4y^2 \frac{\partial^2 z}{\partial y^2} - 4y \frac{\partial z}{\partial y} - z = x^2 y^2 \log y$	10	1
b.	A tightly stretched string with fixed end points x=0 and $x = l$ is initially in a position given by $y = y_0 sin^3 \frac{\pi x}{l}$. If it is released from rest from this position, find the displacement y(x,t).	10	2

5. Attempt any *one* part of the following:

$1 \ge 10 = 10$

Q no.	Question	Marks	CO
a.	An insulated rod of length l itsends A and B maintained at 0°C and 100° C respectively until the steady state condition prevails. If B is suddenly reduced to 0°C and maintained at 0°C, Find the temperature at a distance x from A at time t.		2

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b.	Find th	e multiple	regression	equation	of X ₁ on X	X_2 and X_3	from the data
	Given	below:					
	\mathbf{X}_1	3	5	6	8	12	10
	X_2	10	10	5	7	5	2
	X3	20	25	15	16	15	2

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6. Attempt any *one* part of the following:

$1 \ge 10 = 10$

10

3

Q no.	Question	Marks	CO
a.	State the Bayes' theorem. The probability that a civilian can hit a target is $\frac{2}{5}$ and the probability that an army officer can hit the same target is $\frac{3}{5}$ While the civilian canfire	10	4
	8 shots in the time, the army officer fires 10 shots. If they fire together, then what is the probability that army officer shoots the target?		
b.	Define the Normal distribution. The daily wages of 1000 workers are distributed around a mean of Rs. 140 and with a standard deviation of Rs. 10. Estimate the number of workers whose daily waged will be (i) between Rs. 140 and Rs. 144, (ii) less than Rs. 126 (iii) more than Rs. 160.	10	4

7.	Attempt any <i>one</i> part of the following: $1 \times 10 = 10$		
Q no.	Question	Marks	CO
a.	An IT company wants to appoint an effective trainer to improve the performance of their engineers. Four group of 7,8,10 and 11 engineers from total 36 engineers were given 5 days training by the 4 trainers. Scores were awarded to the engineers at the end of the training on their Skills. Let us examine the preference of one engineer of one trainer over other three trainers. Given that α =0.05 i.e at 5% level of significance the value of F (3,32)=3.29.	10	5
b.	Distinguish between p chart and C chart. The number of defectives in 17 samples of size 500 each from 17 lots is shown below: $ \frac{1}{12} + $	10	5
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