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

Time: 3 Hours Total Marks: 100

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

SECTION A

1. Attempt all questions in brief.

 $2 \times 10 = 20$

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. $x^2 \frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial t^2} = u$	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 D
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: $u(x,0)=20x\ 0\le x\le 5$ $20\ (10-x)\ 5< x<10$ 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

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C.	Find an exponent	ial curve $PV^{\gamma} =$	k for the data:		10	3
			7			
d.	1		llowing data whic	h give the number of yeast cells	10	4
1	per square for 40	0 squares			1	İ
1	X 0 1	2 3 4	5 6 7	8 9 10		
	F 103 14	3 98 42 8	4 2 0	0 0 0	1	1
	It is given that e	.52=0.2674.		· ·		
e.	To test the effect obtained	tiveness of inoc	ulation against ch	olera, the following table was	10	5
1		Attached	Not attached	Total		
	Inoculated	30	160	190		
	Not inoculated	140	460	600		
	Total	170	620	790		
	(The figure repre	esents the number	r of persons)			
					1	
1	OSC CITE SQUARE	test to detend of	or retute the state	ment. The inoculation prevents		1
				ment. The inoculation prevents freedom at 5% level is 3.841.		

3. Attempt any one part of the following:

 $1 \times 10 = 10$

Q no.	Question ***	Marks	CO
a.	Solve $(D+1)(D+D'-1)z = \sin(2x+3y)$	19	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 = 0.30x -18y = 214. What were (a) the mean value of raidd y (b) the standard deviation of y and the co-efficient of correlation between x and y?	10	3

Attempt any one part of the following:

 $1 \times 10 = 10$

Q no.	Question	.Marks	CO
	Solve $x^2 \frac{\partial^2 z}{\partial x^2} - 4y^2 \frac{\partial^2 z}{\partial y^2} - 4y \frac{\partial z}{\partial y} - z = x^2 y^2 \log x$	10	ì
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:

 $1 \times 10 = 10$

Q no.	Question	Marks	CO
a.	An insulated rod of length l itsends A and B maintained at 0°C and 100° C	10	2
	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.		

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b.	Find the		regression	equation	of X ₁ on X	X_2 and X_3	from the data		10	3
	X_1	3	5	6	8	12	10	ļ		
	X_2	10	10	5	7	5	2			
	X ₃	20	25	15	16	15	2	1		

6. Attempt any one part of the following:

 $1 \times 10 = 10$

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	10	4
	probability that an army officer can hit the same target is 3. While the civilian canfire		
	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	10	4
1	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.		

7. Attempt any one part of the following:

1 x 10 = 10

 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 company to the 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 camine 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. 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: Samp 1 2 3 4 5 6 7 8 9 10 11 1 13 14 15 16 17 No. of 20 25 35 45 15 65 15 20 35 23 12 9 21 22 32 35 38 18 Find out the control limits for the number of defective units and also check whether the process is under control or not. 									Que	stion	1	0								Marks	CC
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: Samp 1 2 3 4 5 6 7 8 9 10 11 1 13 14 15 16 17	their of given end of one tr	engine 5 day f the painer	eers. ys tra train	Fou ainin ing c	r gro g by on the er the	the eir S	f 7,8 4 tra kills	3,10 iner Let	and s. Şo t µs\	11 é ores exan	ngin wei nine	eers re av the	fro ward pref	m to led t ferer	tal 3 to the	6 er e en fon	gine gine e en	ers ers a gine	were t the er of	\.\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	.5
No of 20 25 35 45 15 65 15 20 35 23 12 9 21 22 32 35 38 Find out the control limits for the number of defective units and also check whether	Distin	guish	betv	weer	p cl	hart					num	ber (of d	efec	tives	in [7 Sa	mpl	es of	10	5
Find out the control limits for the number of defective units and also check whether		Ī	2	3	4	5	6	7	8	9	10	11	1 2	13	14	15	16	17			
	defec	20	25	35	45	15	65	15	20	35	23	12	9	21	22	32	35	38			
															ether						
		their egiven end of one traction the variation of the var	their engingiven 5 day end of the one trainer the value o Distinguish size 500 ea Samp 1 les No. of defectives	their engineers. given 5 days trained of the train one trainer over the value of F (2) Distinguish bett size 500 each from the value of F (2) Distinguish bett size 500 each from the collectives	their engineers. Fou given 5 days training end of the training cone trainer over othe the value of F (3,32). Distinguish betweer size 500 each from Samp 1 2 3 es No. of 20 25 35 defectives	their engineers. Four grogiven 5 days training by end of the training on the one trainer over other that the value of F (3,32)=3.2 Distinguish between p cl size 500 each from 17 lo Samp 1 2 3 4 4 No. of 20 25 35 45 Find out the control limit	their engineers. Four group of given 5 days training by the end of the training on their S one trainer over other three to the value of F (3,32)=3.29. Distinguish between p chart size 500 each from 17 lots is seen to be	their engineers. Four group of 7, given 5 days training by the 4 training on their Skills one trainer over other three trainer the value of F $(3,32)=3.29$. Distinguish between p chart and size 500 each from 17 lots is shown beautiful and 15 to 6 to	An IT company wants to appoint an etheir engineers. Four group of 7,8,10 given 5 days training by the 4 trainer end of the training on their Skills. Let one trainer over other three trainers, 6 the value of F (3,32)=3.29. Distinguish between p chart and Och size 500 each from 17 lots is shown by the state of the state of the size 500 each from 17 lots is shown by th	An IT company wants to appoint an effect their engineers. Four group of 7,8,10 and given 5 days training by the 4 trainers. So end of the training on their Skills. Let us one trainer over other three trainers, Giver the value of F (3,32)=3.29. Distinguish between p chart and O chart. size 500 each from 17 lots is shown below Samp 1 2 3 4 5 6 7 8 No. of 20 25 35 45 15 65 15 20 defec thicks.	An IT company wants to appoint an effective their engineers. Four group of 7,8,10 and 11 given 5 days training by the 4 trainers. Scores end of the training on their Skills. Let us can one trainer over other three trainers. Given that the value of F (3,32)=3.29. Distinguish between p chart and O chart. The size 500 each from 17 lots is shown below: Samp 1 2 3 4 5 6 7 8 9 9	their engineers. Four group of 7,8,10 and 11 again given 5 days training by the 4 trainers. Scores were end of the training on their Skills. Let us camine one trainer over other three trainers. Given that α = the value of F (3,32)=3.29. Distinguish between p chart and C chart. The numsize 500 each from 17 lots is shown below: $ \frac{Samp}{les} = \frac{1}{2} + \frac{2}{3} + \frac{1}{3} + \frac{5}{6} + \frac{6}{7} + \frac{7}{8} + \frac{9}{9} + \frac{10}{9} +$	An IT company wants to appoint an effective trainer to their engineers. Four group of 7,8,10 and 11 engineers given 5 days training by the 4 trainers. Some were as end of the training on their Skills. Let us examine the one trainer over other three trainers. Given that α =0.05 the value of F (3,32)=3.29. Distinguish between p chart and C chart. The number of size 500 each from 17 lots is shown below: $ \frac{\text{Samp } 1}{\text{les}} = \frac{1}{2} = \frac{3}{3} + \frac{1}{4} = \frac{5}{5} = \frac{6}{6} = \frac{7}{7} + \frac{8}{9} = \frac{9}{10} = \frac{11}{11} = \frac{1}{12} = \frac$	An IT company wants to appoint an effective trainer to in their engineers. Four group of 7,8,10 and 11 companiers from given 5 days training by the 4 trainers. Soores were award end of the training on their Skills. Let us camine the pretone trainer over other three trainers. Given that α =0.05 i.e the value of F (3,32)=3.29. Distinguish between p chart and C chart. The number of disize 500 each from 17 lots is shown below: $ \frac{Samp}{les} = \frac{1}{2} = \frac{2}{3} = \frac{3}{4} = \frac{1}{5} = \frac{6}{6} = \frac{7}{8} = \frac{9}{9} = \frac{10}{10} = \frac{11}{11} = \frac{1}{2} = \frac{1}{10} = \frac{11}{10} = \frac{1}{10} = 1$	An IT company wants to appoint an effective trainer to improtheir engineers. Four group of 7,8,10 and 11 engineers from to given 5 days training by the 4 trainers. Some were awarded the end of the training on their Skills. Let us examine the preference one trainer over other three trainers. Given that α =0.05 i.e at 50 the value of F (3,32)=3.29. Distinguish between p chart and O chart. The number of defective size 500 each from 17 lots is shown below: Somp 1 2 3 4 5 6 7 8 9 10 11 1 13 13 13 15 16 15 15 15 15 15 15 15 15 15 15 15 15 15	An IT company wants to appoint an effective trainer to improve the their engineers. Four group of 7,8,10 and 11 companiers from total 3 given 5 days training by the 4 trainers. Some were awarded to the end of the training on their Skills. Let us trainine the preference of one trainer over other three trainers. Given that α =0.05 i.e at 5% level the value of F (3,32)=3.29. Distinguish between p chart and C chart. The number of defectives size 500 each from 17 lots is shown below: $ \frac{Samp}{lea} = \frac{1}{2} = \frac{1}{3} = \frac{1}{4} = \frac{1}{5} = \frac{1}{6} = \frac{1}{7} = \frac{1}{8} = \frac{1}{9} = \frac{1}{10} = \frac{11}{11} = \frac{1}{13} = \frac{14}{15} = \frac{1}{15} = \frac{1}{15$	An IT company wants to appoint an effective trainer to improve the per their engineers. Four group of 7,8,10 and 11 company wants to appoint an effective trainer to improve the per their engineers. Four group of 7,8,10 and 11 company wants to appoint an effective trainers from total 36 er given 5 days training by the 4 trainers. Some were awarded to the engineer of the training on their Skills. Let us camine the preference of on one trainer over other three trainers. Given that α =0.05 i.e at 5% level of the value of F (3,32)=3.29. Distinguish between p chart and O chart. The number of defectives in 1 size 500 each from 17 lots is shown below: $ \frac{\text{Samp } 1}{\text{loc}} = \frac{1}{2} = \frac{2}{3} = \frac{1}{4} = \frac{5}{15} = \frac{6}{15} = \frac{7}{15} = \frac{9}{10} = \frac{11}{11} = \frac{13}{11} = \frac{14}{15} = \frac{15}{15} = \frac{15}{$	An IT company wants to appoint an effective trainer to improve the performance their engineers. Four group of 7,8,10 and 11 engineers from total 36 engine given 5 days training by the 4 trainers. Some were awarded to the engineer end of the training on their Skills. Let us examine the preference of one engone trainer over other three trainers. Given that α =0.05 i.e at 5%level of significant that α =0.05 i.e at	An IT company wants to appoint an effective trainer to improve the performant their engineers. Four group of 7,8,10 and 11 connects from total 36 engineers given 5 days training by the 4 trainers. Soores were awarded to the engineers a end of the training on their Skills. Let us camine the preference of one engine one trainer over other three trainers. Given that α =0.05 i.e at 5% level of signific the value of F (3,32)=3.29. Distinguish between p chart and C chart. The number of defectives in 17 sample size 500 each from 17 lots is shown below: $ \frac{\text{Samp 1}}{\text{loc}} = \frac{2}{3} = \frac{3}{4} = \frac{4}{5} = \frac{5}{6} = \frac{7}{7} = \frac{8}{9} = \frac{9}{10} = \frac{11}{2} = \frac{13}{13} = \frac{14}{15} = \frac{15}{16} = \frac{17}{17} = \frac{15}{17} = 1$	An IT company wants to appoint an effective trainer to improve the performance of their engineers. Four group of 7,8,10 and 11 companies from total 36 engineers were given 5 days training by the 4 trainers. Some were awarded to the engineers at the end of the training on their Skills. Let us camine 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. Distinguish between p chart and O chart. The number of defectives in 17 samples of size 500 each from 17 lots is shown below: $ \frac{Samp}{les} = \frac{1}{2} \frac{2}{3} \frac{1}{4} \frac{1}{5} \frac{5}{6} \frac{7}{7} \frac{8}{8} \frac{9}{9} \frac{10}{10} \frac{11}{11} \frac{1}{13} \frac{14}{15} \frac{15}{16} \frac{17}{17} $ No of 20 25 35 45 15 65 15 20 35 23 12 9 21 22 32 35 38 defectives in 17 samples of the number of defective units and also check whether	An IT company wants to appoint an effective trainer to improve the performance of their engineers. Four group of 7,8,10 and 11 companies from total 36 engineers were given 5 days training by the 4 trainers. Some were awarded to the engineers at the end of the training on their Skills. Let us camine 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. Distinguish between p chart and O chart. The number of defectives in 17 samples of size 500 each from 17 lots is shown below: Samp 1 2 3 4 5 6 7 8 9 10 11 1 13 14 15 16 17 No. of 20 25 35 45 15 65 15 20 35 23 12 9 21 22 32 35 38 No. of 20 25 35 45 15 65 15 20 35 23 12 9 21 22 32 35 38 Find out the control limits for the number of defective units and also check whether