KIET Group of Institutions

MODEL PAPER 1

Mathematics-IV (KAS-302)

Duration: 3 hrs **Max. Marks: 100**

Note: - Attempt all the Questions.

Q. No.		Question	Marks	CO
1.	a	Solve partial differential equation $2p + 3q = 4$	2	1
	b	Calculate P.I. of $(D^2 - 3DD' + 2D'^2)z = \sin(x - 2y)$	2	1
	c	Tell the classification of the following partial differential equation $\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial x\,\partial t} + 4\frac{\partial^2 u}{\partial t^2} = 0$	2	2
	d	Write Tetephone equations.	2	2
	e	Explain kurtosis?	2	3
	f	Write the formula for rank correlation in the case of tied ranks.	2	3
	g	If P(A)=1/6 and P(B)=1/8 find P(AB).	2	4
	h	For the Binomial distribution $\left(\frac{1}{3} + \frac{2}{3}\right)^{10}$ determine the mean.	2	4
	i	Write the control limits of np-chart.	2	5
	j	What you mean by level of significance?.	2	5

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2	Solve the partial differential equation $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$ OR Determinethe solution of Cauchy problem $u_x + u_y = x + y;\ u(x,0) = 0.$	6	1
3	Determine the solution of the equation: $4\frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 3u;\ \ u(x,0) = 3e^{-x} - e^{-5x}, when\ t = 0$ OR An insulated rod of length l has its ends A and B maintained at 0^oC and 100^0C respectively until steady state conditions prevail. If B is suddenly reduced to 0^0C and maintained at 0^0C then determine the temperature at a distance x from A at time t.	6	2
4	Examine the least square fit of the $f(x) = a + bx$ the following data: x: 0 1 2 3 4 f(x): 1 4 10 17 30 OR If θ is the acute angle between the two regression lines in the case of two variables x and y, show that $tan\theta = \left(\frac{1-r^2}{r}\right)\left(\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}\right)$, where r, σ_x and σ_y have their usual meanings.	6	3
5	A can hit a target 4 times in 5 shots; B 3 times in 4 shots; C twice in 3 shots. They fire a volley. Calculate the probability that at least two shots hit? OR A die is tossed thrice. A success is getting 1or 6 on a toss. Calculate the mean and the variance of the number of successes.	6	4

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6	Ten individuals are chosen at random from a normal population of students and their heights are found to be in inches 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Discuss the suggestions that the mean height of universe is 66. t for 9 degree of freedom at 5% level of significance is 2.262. OR Discuss whether there is any association between Area and pollution index of the city for which the data is given Area/Pollu.ind. | high | low | Total Urban | 150 | 350 | 500 Rural | 250 | 350 | 600 Given that $\chi^2_{0.05} = 3.84$.	6	5

Q. No.	Question	Marks	CO
7	Solve the solution of partial differential equation $r + s - 2t = \sqrt{2x + y}$ OR Use Charpit's method to evaluate the solution of $(p^2 + q^2)y = qz$	10	1
8	Determine the solution of Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the boundary conditions u (0, y) = 0, u (10, y) =0, u(x, 0) =0 u (x, a) = $A\sin\frac{3\pi x}{10}$ OR Determine the deflection of the vibrating string which is fixed at the ends x=0 and x=10 and the motion is started by displacing the string in to the form $\sin^3(\frac{\pi x}{10})$ and releasing it with zero initial velocity.	10	2
9	Calculate the correlation coefficient for the following data: x | 60 | 34 | 40 | 50 | 45 | 41 | 22 | 43 y | 75 | 32 | 34 | 40 | 45 | 33 | 12 | 30 OR From the data given, determine the lines of regression. x | 2 | 4 | 6 | 8 | 10 y | 5 | 7 | 9 | 8 | 11	10	3
10	Out of 800 families with 5 children each, Determine the number of families would be expected to have3 boys and 2 girls (ii) 2 boys and 3 girls (iii) no girl (iv) at the most two girls. (Assume probabilities for boys and girls to be equal). OR In a normal distribution, 31% of the items are under 45 and 8% are over 64. Determine the mean and standard deviation of distribution. It is given that $f(t) = \frac{1}{\sqrt{2\Pi}}\int_0^t e^{-\frac{x^2}{2}}dx$ then $f(0.5) = 0.19$ and $f(1.4) = 0.42$.	10	4
11	The following table gives the crops on 15 sample plots under three varieties of seeds: Type I | 20 | 21 | 23 | 16 | 20 Type II | 18 | 20 | 17 | 15 | 25 Type III | 25 | 28 | 22 | 28 | 32	10	5

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	Explain that the seed varieties show variations more than could be covered by sampling variations. Given that the tabulated value of F for 2 and 12 degrees of freedom is 3.88 at 5% level of significance.		
	OR		
	Distinguish between np-chart and p-chart. Following is the data of defective of 10 samples of size 100 each.Construct np-chart and explain your findings.		

Sample no.	1	2	3	4	5	6	7	8	9	10
No. of defectives	6	9	12	5	12	8	8	16	13	7

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