APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. P. Code :TE08201201-I   (Pages: 4)

Name: ....

Reg. No:...

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Branch: Civil Engineering   **Specialization: Transportation Engineering**

08MA6201 Applied Statistics and Probability

(Common to TE)

Time: 2 hour 15 minutes   Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1.a	Derive mean variance of Poisson distribution	3

Answer b or c

b	In a N.D. 31% of the items are under 45 and 8% over 64. Find the mean and variance.	6
c	The time in hours required to repair a machine is exponentially distributed with mean 20. What is the probability that the required time i) Exceeds 30 hrs ii) Between 16 hrs and 24 hrs	6

Q. No.	Module 2	Marks
2.a	In a random sample of size 500, mean is 20. In another independent sample of size 400, mean is 15. If samples are drawn from the same population with standard deviation 4, find 95% confidence limit.	3

Answer b or c

b	A survey of 320 families with 5 children each revealed the following information	6

No.of boys	5	4	3	2	1	0
No.of girls	0	1	2	3	4	5
No.of faqmilies	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally probable?

c	Samples of size 10 and 14 were taken from two normal populations with standard deviation 3.5 and 5.2. The sample means were found to be 20.3 and 18.6. Test whether the means of the two populations are the same at 5% significance level.	6

Q. No.	Module 3	Marks
3.a	Explain Spearman's rank correlation in distinct and repeated values.	3

Answer b or c

b	Fit a second degree parabola to the following data	6

x	1	2	3	4	6	8
y	24	3	26	4	5	6

c	Write two regression lines from the following data	6

X	60	72	69	58	73	82	85	76	82	65
Y	65	68	75	62	75	83	87	78	85	66

Q. No.	Module 4	Marks
4.a	Explain basic principles of experimental design	3

Answer b or c

b	A trucking company wishes to test the average life of each of the four brands of tyres. The company uses all brands on randomly selected trucks. The records showing the lives (thousands of miles) of tyres are given below. Test the hypothesis that the average life for each brand of tyres is the same. Assume $\alpha = 0.01$	6

Brand 1	Brand 2	Brand 3	Brand 4
20	19	21	15
23	15	19	17
18	17	20	16
17	20	17	18
	16	16	

c   The Latin square design experiments were conducted on 9 plots of sugar cane.   **6**
     The design and yield per plot are given. Analyse the data to interpret the results

A20	B10	C16
B15	C20	A25
C25	A15	B20

Q. No.   **Module 5**   **Marks**

5.a   Describe ARIMA model.   **4**

Answer b or c

b   Maxus Pizza point is a small restaurant catering to people with a taste for   **8**
     European pizza. One of their specialities is Maxus special pizza. The manager
     must forecast the weekly demand for these special pizzas so that he can order
     the ingredients weekly. The recent demand has been as follows

Week of	Pizzas
June 2	50
June 9	65
June 16	52
June 23	56
June 30	55
July 7	60

i) Forecast the demand for pizza for June 23 to July 14 by using the simple
average method with n=3. Then repeat the forecast by using the weighted
moving average method with n=3 and weights 0.5,0.3 and 0.2 with 0.5
applying to the recent demand.

ii) Calculate the MAD for each method

c   Calculate the forecast for 11th month and MSE for the following data using exponential smoothing method with $\alpha = 0.3$ **8**

Months	Sales
1	27
2	30
3	32
4	31
5	28
6	27
7	30
8	33
9	33
10	31

Q. No.	Module 6	Marks

6.a   Explain Bivariate normal distribution and also its marginal and conditional distributions.   **4**

Answer b or c

b   Write the covariance matrix for the following data   **8**

X	Y	Z
60	65	58
55	59	61
72	75	73
58	61	53
38	53	49

c   The amount of rainfall at US weather station in January is a random variable X and the amount in February at the same station is a random variable Y. Suppose $(X,Y) \sim BVN(6, 4, 1, 0.25, 0.1)$. Find $P[X \le 5]$ and $P[Y \le 5 / X = 5]$.   **8**

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