

Name :
Reg No :

{ A }

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

07 THRISSUR CLUSTER

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DEC 2017

Department of Civil Engineering

(common for EE and WR&HI)

07MA6001 APPLIED STATISTICS

Time : 3 hours

Max .Marks: 60

Answer all six questions. Part 'a' of each question is compulsory.
Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1a	The height of students is normally distributed with mean 54 and SD 12 inches. What percentage of students has height between 46 and 56 inches?	4
	Answer b or c	
b	Given the pdf of X as $f(x)=f(x) = \begin{cases} kx^2, & 0 \leq x < 5 \\ 5k(10 - x), & 5 \leq x \leq 10 \end{cases}$ Find the value of k and P (X<7).	5
c	The time in years to failure of certain components of a system is a random variable following exponential distribution with mean $\beta=5$. If 5 of these components are in different systems, find the probability that at least 2 components are still functioning at the end of 8 years.	5
Q.no.	Module 2	Marks
2a	In a partially destroyed record of correlation data of X and Y, Variance of X is 9 and the regression equations are $8x-10y+66=0$ and $40x-18y=214$. Find the mean values of X and Y and the correlation coefficient between them.	4
	Answer b or c	
b	Calculate the correlation coefficient between X and Y from X : 98 70 40 20 85 75 95 80 10 5 Y : 85 65 32 30 80 60 80 70 20 10	5
c	Find $r_{12.3}$ and $R_{1.23}$ if $r_{12}=0.6$, $r_{13}=0.7$, $r_{23}=0.65$	5
Q.no.	Module 3	Marks
3a	Explain the sampling distributions of mean.	4
	Answer b or c	
b	State central limit theorem. Use this to find the probability that the error will be less than 1.2 if the mean of a random sample of size 25 is used to estimate the mean of an infinite population with SD 2.4.	5
c	If independent random samples of sizes $n_1=n_2=8$ came from a normal population having same variance, what is the probability that either sample variance will be at least 7 times as large as the other.	5
Q.no.	Module 4	Marks
4a	If x_1, x_2, \dots, x_n is a random sample from $N(\mu, 1)$, show that $t = \frac{1}{n} \sum_{i=1}^n x_i^2$ is an unbiased estimator of $\mu^2 + 1$.	4

Answer b or c

- b** Obtain the maximum likelihood estimates of α and β for a random sample from $f(x; \alpha; \beta) = y_0 e^{-\beta(x-\alpha)}$, $\alpha \leq x < \infty$, y_0 is a constant. **5**
- c** Given a random sample of size 9 from $N(\mu, \sigma^2)$ as 8.6, 7.9, 8.3, 6.4, 8.4, 9.8, 7.2, 7.8, 7.6. Construct 90% confidence interval for σ^2 . **5**

Q.no.	Module 5	Marks
--------------	-----------------	--------------

- 5a** A machinist is making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inches with a SD of 0.040 inch. Test whether the work meets the specification. **5**

Answer b or c

- b** In a year, there are 956 births in a town A, of which 52.5% are males, while in towns A and B combined, this proportion in a total of 1406 births was 0.496. **7**
- Is there any significant difference in the proportion of male births in the two towns?

- c** Fit a Poisson distribution to the data and test the goodness of fit **7**

x : 0 1 2 3 4 5
f : 142 156 69 27 5 1

Q.no.	Module 6	Marks
--------------	-----------------	--------------

- 6a** What are the components of a time series? **5**

Answer b or c

- b** Three different machines are used for a population on the basis of the outputs. Test whether the machines are equally effective. **7**

Outputs

Machines	I	II	III
	10	9	20
	15	7	16
	11	5	10
	10	6	14

- c** The following table gives the number of refrigerators sold by 4 salesman A ,B ,C and D in 3 months **7**

Month ↓	A	B	C	D
I	50	40	48	39
II	46	48	50	45
III	39	44	40	39

Is there any significant difference in the sale made by the four salesman ?

(Note: The sub question 'a' will be compulsory one, testing the knowledge on fundamental aspects. Parts 'b' and 'c' shall preferably be application type questions with the choice to answer any one.)