

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester B.Arch Degree Regular and Supplementary Examination December 2020

Course Code: MA103
Course Name: MATHEMATICS

Max. Marks: 60

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

- | | | Marks |
|---|--|-------|
| 1 | The mean of 200 items was 50. Later on it was discovered that two items were misread as 92 and 8 instead of 192 and 88. Find out the correct mean. | (3) |
| 2 | Define random variable with an example. | (3) |
| 3 | Write a brief description about the errors occurred in sampling. | (3) |

PART B*Answer any three questions, each carries 5 marks.*

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|-----------------|--|-----------------|----|----|----|-----|-----|-----|-----|---|---|-------|---|----|----|----|----|-----|-----|-----|-----|--|
| 4 | A random variable X has the following probability distribution: | (5) | | | | | | | | | | | | | | | | | | | | |
| | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">Values of X, x:</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: left;">p(x):</td> <td style="text-align: center;">a</td> <td style="text-align: center;">3a</td> <td style="text-align: center;">5a</td> <td style="text-align: center;">7a</td> <td style="text-align: center;">9a</td> <td style="text-align: center;">11a</td> <td style="text-align: center;">13a</td> <td style="text-align: center;">15a</td> <td style="text-align: center;">17a</td> </tr> </table> | Values of X, x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | p(x): | a | 3a | 5a | 7a | 9a | 11a | 13a | 15a | 17a | |
| Values of X, x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | | | | | | | | | | |
| p(x): | a | 3a | 5a | 7a | 9a | 11a | 13a | 15a | 17a | | | | | | | | | | | | | |
| | (i) Determine the value of a. | | | | | | | | | | | | | | | | | | | | | |
| | (ii) Find $P(X < 3)$, $P(2 \leq X < 5)$ | | | | | | | | | | | | | | | | | | | | | |
| | (iii) What is the smallest value of x for which $P(X \leq x) > 0.5$? | | | | | | | | | | | | | | | | | | | | | |
| 5 | In a given city, 6% of all drivers get at least one parking ticket per year. Use Poisson distribution to determine the probabilities that among 80 drivers | (5) | | | | | | | | | | | | | | | | | | | | |
| | (a) four will get at least one parking ticket in any given year. | | | | | | | | | | | | | | | | | | | | | |
| | (b) At least 3 will get at least one parking ticket in any given year. | | | | | | | | | | | | | | | | | | | | | |
| 6 | The average marks in Mathematics of a sample of 100 students was 51 with a standard deviation of 6 marks. Could this have been a random sample from a population with average marks 50 ? | (5) | | | | | | | | | | | | | | | | | | | | |
| 7 | A random sample of 10 boys had the I.Q's 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100. Do these data support the assumption of a population mean I.Q of 100 (at 5% level of significance) ? | (5) | | | | | | | | | | | | | | | | | | | | |

PART C*Answer all question, each carries 10 marks.*

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|---|--|------|
| 8 | A) The scores obtained by two batsmen A and B in 10 matches are given below. | (10) |
|---|--|------|

A:	30	44	66	62	60	34	80	46	20	38
B	34	46	70	38	55	48	60	34	45	30

Calculating mean, standard deviation and coefficient of variation for each batsman, determine who is more efficient and who is more consistent ?

OR

- B) Fit a parabola of the form $y = a + bx + cx^2$ to the following data by the method of least squares. Estimate the value of y when $x = 10$. (10)

x:	1	2	3	4	5	6	7	8	9
y:	2	6	7	8	10	11	11	10	9

- 9 A) If a continuous random variable X has the PDF $f(x) = \begin{cases} ke^{-2x}; & x > 0 \\ 0; & x \leq 0 \end{cases}$ (10)
Then find (i) value of k (ii) $P(0 < X < 3)$, $P(X > 0.5)$ (iii) Mean (iv) Variance

OR

- B) (i) In a normal distribution 7% of the items are under 35 and 89% are under 63. (6)

What are the mean and standard deviation of the distribution ?

- (ii) The probability that a pen manufactured by a company will be defective is $\frac{1}{10}$. If 12 such pens are manufactured, find the probability that (a) exactly two will be defective (b) at least two will be defective using Binomial distribution. (4)

- 10 A) (i) The means of two large samples of 1000 and 2000 members are 168.75cms and 170cms respectively. Can the samples be regarded as drawn from the same population of standard deviation 6.25cms. (Use 5% level of significance) (5)
(ii) A sample of 400 observations has mean 95 and standard deviation 12. (5)
Could it be a random sample from a population with mean 98?

OR

- B) A group of 10 boys fed on diet A and another group of 8 boys fed on a different diet B recorded the following increase in weight (kgs). (10)
- | | | | | | | | | | | |
|----------|---|---|---|---|----|---|---|---|---|----|
| Diet A : | 5 | 6 | 8 | 1 | 12 | 4 | 3 | 9 | 6 | 10 |
| Diet B : | 2 | 3 | 6 | 8 | 10 | 1 | 2 | 8 | | |

Does it show the superiority of diet A over the diet B ?
