# University of Mumbai
## Examination Second Half 2021 under cluster __ (Lead College: _____)
### Examinations Commencing from 28th March 2022 to 5th April 2022
Program: **MCA**
Curriculum Scheme: MCA ( 2year – 2020 Course)
Examination: M.C.A Semester I
Course Code: MCA11 and Course Name: Mathematical Foundations for Computer Science1

Time: 2 hour 30 minutes                                                        Max. Marks: 80

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| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks                                    [20 Marks] |
|---|---|
| 1. | If $V(X) = 1$ then, $V(5X+3) = ?$ |
| Option A: | 9 |
| Option B: | 5 |
| Option C: | 12 |
| Option D: | 25 |
| | |
| 2. | A die is rolled 3 times. What is the probability of 3 fives? |
| Option A: | 125/216 |
| Option B: | 75/216 |
| Option C: | 1/216 |
| Option D: | 3/216 |
| | |
| 3. | Regression of y on x is |
| Option A: | $(y - \bar{y}) = b_{yx}(x - \bar{x})$ |
| Option B: | $(x - \bar{x}) = b_{xy}(y - \bar{y})$ |
| Option C: | $(x - \bar{y}) = b_{yx}(y - \bar{x})$ |
| Option D: | $(y - \bar{x}) = b_{xy}(x - \bar{y})$ |

4. For the following what is bivariate probability distribution of X and Y, Find $P(X \leq 1)$

| X \ Y | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1/32 | 2/32 | 2/32 | 3/32 |
| 1 | 1/16 | 1/16 | 1/8 | 1/8 | 1/8 | 1/8 |
| 2 | 1/32 | 1/32 | 1/64 | 1/64 | 0 | 2/64 |

| | |
|---|---|
| Option A: | 1/16 |
| Option B: | 7/8 |
| Option C: | 11/64 |
| Option D: | 1/32 |
| | |
| 5. | The z-test is used when number of samples are |
| Option A: | greater than 10 |
| Option B: | less-than 10 |
| Option C: | greater-than-30 |
| Option D: | less-than 25 |
| | |
| 6. | If Q1=3, Q2 = 4 and Q3=5 Find Bowley's coefficient of skewness. |
| Option A: | 0.4 |
| Option B: | 0 |

| Option C: | 0.2 |
|---|---|
| Option D: | -0.5 |
| | |
| 7. | Find the probability of constructing a two digit even number using the digits 2,3,4,5,6 if repetition of digits is allowed |
| Option A: | 0.6 |
| Option B: | 0.5 |
| Option C: | 0.2 |
| Option D: | 0.1 |
| | |
| 8. | Suppose A and B are events with P(A)=0.5, P(B)=0.4 and P(A∩B)=0.3 find the probability that A or B occurs |
| Option A: | 0.3 |
| Option B: | 0.7 |
| Option C: | 0.1 |
| Option D: | 0.6 |
| | |
| 9. | The distribution in which mean=85, median=83 and mode=81 will be |
| Option A: | Symmetrical |
| Option B: | Positive skewed |
| Option C: | Negative skewed |
| Option D: | None of these |
| | |
| 10. | Two regression lines are given by the equations 2x + y =30 and 3x +5y =52. Find the values of $\bar{x}$ , $\bar{y}$ |
| Option A: | $\bar{x} = 14$ , $\bar{y} = 2$ |
| Option B: | $\bar{x} = 12$ , $\bar{y} = 1$ |
| Option C: | $\bar{x} = 14$ , $\bar{y} = 1$ |
| Option D: | $\bar{x} = 2$ , $\bar{y} = 14$ |

| Q2 | Solve any Two Questions out of Three  (10 marks each)              [20 Marks] | | | | | |
|---|---|---|---|---|---|---|
| A | The following table gives the frequency distribution of waiting time of 75 persons at a ticket counter to buy a movie ticket. | | | | | |
| | Waiting time (in minutes) | 0-6 | 7-13 | 14-20 | 21-27 | 28- 34 |
| | frequency | 5 | 12 | 18 | 30 | 10 |
| | Compute the Bowley's coefficient of skewness | | | | | |
| B | The art competition has entries from three painters Radha, Meera and Sana. <br> (i)      Radha put in 15 paintings, 4% of her works have won first prize. <br> (ii)     Meera put in 5 paintings, 6% of her works have won first prize. <br> (iii)    Sana put in 10 paintings, 3% of her works have won first prize. <br> What is the probability (chance) that Radha will win first prize? | | | | | |
| C | Monthly demand for transistors is known to have the following probability distribution | | | | | |
| | Demand | 1 | 2 | 3 | 4 | 5 | 6 |
| | Probability | 0.10 | 0.15 | 0.20 | 0.25 | 0.18 | 0.12 |
| | Cost | 10500 | 11000 | 11500 | 12000 | 12500 | 13000 |
| | (i)      Determine the expected demand of transistor <br> (ii)     Obtain the variance <br> (iii)    Suppose that the cost (C) of producing n transistors is given by the rule C. Find expected cost of transistors | | | | | | |

| Q3. | Solve any Two Questions out of Three  (10 marks each)          [20 Marks] |
|------|--------------------------------------------------------------------------|

**Q3.** Solve any Two Questions out of Three  (10 marks each)          **[20 Marks]**

**A** The Probability that a baby is born a boy is 0.51 A mid-wife delivers 10 babies. Find
(i)    The Probability that exactly 4 are male
(ii)   The Probability that at least 8 are male

**B** Find Spearman's rank correlation for the following data

| Marks in DMBI | 64 | 50 | 44 | 42 | 56 | 65 | 59 |
|---------------|----|----|----|----|----|----|----|
| Marks in SEPM | 80 | 60 | 37 | 51 | 30 | 75 | 44 |

**C** Suppose that life in hours of a certain type of radio tube is a continuous random variable X with p.d.f given by

$$f(x) = \begin{cases} \dfrac{100}{x^2} & x \geq 100 \\ 0 & otherwise \end{cases}$$

(i)    What is the probability that all of the original three tubes in a given set will have to be replaced in the first 150 hours of operations?
(ii)   What is the probability that a tube will last less than 200 hours if it is known that the tube is still functioning after 150 hours of service?

**Q4.** Solve any Two Questions out of Three  (10 marks each)          **[20 Marks]**

**A** Given the following bivariate probability distribution obtain
(i)    Marginal distribution of X and Y
(ii)   The conditional distributions of X  given Y=1
(iii)  P(X +Y) <4

| Y \ X | 1 | 2 | 3 |
|-------|-----|-----|-----|
| 1 | 0.1 | 0.1 | 0.2 |
| 2 | 0.2 | 0.3 | 0.1 |

**B** The following table gives the number of car accidents in a city during a week. Find whether the accidents are uniformly distributed over a week.

| Day | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-----|-----|-----|-----|-----|-----|-----|-----|
| No. of accidents | 10 | 17 | 11 | 13 | 17 | 14 | 16 |

(given for 6 degrees of freedom at 5% level of significance, the table value of $\chi^2$ is 12.59)

**C** Obtain the equation of regression line for the following values of x and y

| x | 1 | 3 | 4 | 6 | 8 | 9 | 11 | 14 |
|---|---|---|---|---|---|---|----|----|
| y | 1 | 2 | 4 | 4 | 5 | 7 | 8 | 9 |

Find the value of corresponding regression coefficient.

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