



25805609

QP CODE: 25805609

Reg No : .....

Name : .....

**M.C.A. DEGREE EXAMINATION, NOVEMBER 2025**

**First Semester**

Faculty of Technology & Applied Science

Master of Computer Application

**CORE - MCACT101 - MATHEMATICAL & STATISTICAL FOUNDATION FOR  
COMPUTER APPLICATIONS**

2020 Admission Onwards

0DCA73E4

Time: 3 Hours

Maximum: 75 Marks

**Part A**

*Answer any **ten** questions*

*Each question carries 3 marks*

1. State and prove distributive laws on sets.
2. If R is a relation on  $A = \{1, 2, 3\}$ , such that  $(a, b) \in R$  iff  $a + b$  is even. Find the relation matrix.
3. Discuss one -one and onto functions with examples.
4. List the connectives in Mathematical logic and write their truth table.
5. Show that the formula  $(p \vee q) \wedge (\neg p) \wedge (\neg q)$  is a contradiction.
6. Negate the following sentence by writing it in symbolic form using quantifiers – “ Every city in Canada is clean”.
7. The two regression coefficients are -0.7 and -0.2. Find Correlation coefficient.
8. Write the sample space of the random experiment of tossing 3 coins simultaneously and observing the faces.
9. Find the distribution function of the density function  $f(x) = \frac{1}{6}$ ,  $x=1,2,3,4,5,6$
10. Distinguish between point estimation and interval estimation.
11. What is Type I and Type II errors.
12. Explain the procedure of testing of goodness of fit.

(10×3=30 marks)





**Part B**

Answer *all* questions

Each question carries 9 marks

13. a) Define equivalence relation. Find the equivalence relation that generates the partition  $\{0,1,3\}$ ,  $\{2\}$  and  $\{4\}$  of the set  $A=\{0,1,2,3,4\}$ . Also write relation matrix and draw the graph of the relation.

OR

- b) Determine whether the functions  $f$  and  $g$  are bijections from  $R$  to  $R$  where  $f(x) = 2x - 3$  and  $g(x) = x^2 + 1$ . Find  $f \circ g$  and  $g \circ f$ ?

14. a) Show that  $R \wedge (P \vee Q)$  is a valid conclusion from the premises  $(P \vee Q)$ ,  $Q \rightarrow R$ ,  $P \rightarrow M$  and  $\sim M$ .

OR

- b) Prove the implication  $\forall x (P(x) \rightarrow Q(x)), \forall x (R(x) \rightarrow \sim Q(x)) \Rightarrow \forall x (R(x) \rightarrow \sim P(x))$ .

15. a) Find Karl Pearson's Correlation coefficient for the following data.

X	11	12	13	14	15	16	17	18	19	20
Y	30	29	29	25	24	24	24	21	18	15

OR

- b) Three identical boxes contain two balls each. One has both red, one has one red and one black and the third has two black balls. A person chooses a box at random and takes out a ball. i) Find the probability that the selected ball is red. ii) If the ball is red find the probability that the other ball in the box is also red.

16. a) A random variable  $X$  has the following probability distribution. Find (i) the value of  $k$  (ii)  $P(X < 2)$  (iii)  $P(-2 < X < 2)$ .

X	-2	-1	0	1	2	3
P(X)	0.1	k	0.2	2k	0.3	3k

OR

- b) In a normal distribution 17% of items are below 30 and 17% of items are above 60. Find the mean and standard deviation of the normal distribution.

17. a) A random sample of boots worn by 36 soldiers in a desert region showed an average life of 1.08 years with a standard deviation of 0.6 years. Under the standard conditions, the boots are known to have an average life of 1.28 years. Is there a reason to assert, at 1% level of significance, that use in desert causes the mean life of such boots to decrease? Assume that the life of boots is normally distributed.

OR





- b) An examination was given to 50 students at college A and to 60 students at college B .At college A the mean grade was 75 with S.D of 9 and at college B the mean grade was 79 with S.D of 7. Is there significant difference between the performance of the students at A and those at B. Given that ( $\alpha = 0.05$ ).

(5×9=45 marks)

