QP CODE: 24800324

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Reg No : .....

Name : .....

M.C.A. DEGREE EXAMINATION, JANUARY 2024

First Semester

Faculty of Technology & Applied Science

Master of Computer Application

CORE - MCACT101 - MATHEMATICAL & STATISTICAL FOUNDATION FOR COMPUTER APPLICATIONS

2020 Admission Onwards

9185361D

Time: 3 Hours Maximum: 75 Marks

Part A

*Answer any **ten** questions*

*Each question carries **3** marks*

1. If R is a relation on A= {1, 2, 3, 4 }, such that (a, b) ∈ R iff a + b is odd. Draw the graph of the relation.

2. Find the equivalence classes of the relation R={ (1,1),(1,2),(2,1), (2,2),(3,3)} on A= {1,2,3} and draw the relation graph

3. Let f and g be two real valued functions, defined by, $f(x)=x^{2,}$ g(x)=3x+2 . Find the value of (f+g)(−2)?

4. List the connectives in Mathematical logic and write their truth table.

5. What is tautology? Explain.

6. Explain truthset of a porpositional funcion.

7. Define the term Correlation.

8. Define Random experiment.Give an example

9. Define Random Variable?

10. What do you mean by sampling distribution?

11. Distinguish between Simple and Composite hypothesis.Give one example each

12. Define the terms (i) Critical Region (ii) Critical Value (iii) Significance Level

(10×3=30 marks)

Part B

*Answer **all** questions*

*Each question carries **9** marks*

13. a) Show that the relation R is an equivalence relation in the set A = { 1, 2, 3, 4, 5 } given by the relation R = { (a, b): |a-b| is even }. Also write the relation matrix and draw the graph of the relation.

OR

b) Let *f* and *g* are functions from R to R defined by f(x) = 2x -1 and g(x)= $3x^2$+ 4 .
(i) Determine whether *f* is invertible and if so, determine f^{-1}
(ii) Find *fog* and *gof*

14. a) If p and q are two statements, then prove that : i) ⌐ (p ∧ q) ≡ (⌐p ∨ ⌐ q)
ii) (⌐p ∨q) ∧ (⌐q ∨ p) ≡ p ↔ q

OR

b) Show that ∃ x, Q(x) follows logically from ∀ x (P(x) → Q(x)), and ∃ x, 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) There are two identical boxes containing respectively 4 white and 3 red balls,3 white and 7 red balls . A box is chosen at random and a ball is drawn from it. i)Find the probability that the selected ball is white ii) If the ball is white ,what is the probability that it is from the first box?

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 sample of 200 boys who passed university examination are found to have mean marks 50 with S.D 5 for English. The mean marks of 100 girls was found to be 48 with S.D 4. Does this indicate any significant difference between the abilities of boys and girls assuming the S.D's the same. ($\propto = 0.05$)

OR

b) Apply a suitable test to examine whether the following figures provide evidence of the effectiveness of inoculation.

	Attacked	Not Attacked
Inoculated	20	300
Not Inoculated	80	360

(5×9=45 marks)