

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**U.G DEGREE EXAMINATION – ALLIED****FOURTH SEMESTER – APRIL 2023****UMT 4401 – MATHEMATICS FOR COMMERCE**

Date: 04-05-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION A - K1 (CO1)**Answer ALL the Questions****(10 x 1 = 10)****1. Answer the following**

a) State Simple interest.

b) Write the truth table for AND operator.

c) Examine the equilibrium price by the method of excess demand given the functions:

$$Q_d = 50 - \frac{8p}{7} ; Q_s = 10 + \frac{2p}{3}.$$

d) Integrate $\int 5x^2 dx$.

e) Define Boolean algebra.

2. Fill in the blanks

a) _____ is the reduction in the value of fixed assets such as buildings and equipment's through normal use or age.

b) The statement $P \rightarrow Q$ has the truth value F when P isand Q is

c) The formula to find elasticity of demand is

d) Integration can often be facilitated by the substitution of a new variable for the given..... variable.

e) De Morgan's law states that $a(b + c)' = \dots\dots\dots$ **SECTION A - K2 (CO1)****Answer ALL the Questions****(10 x 1 = 10)****10)****3. Choose the correct answer for the following**

a) The nominal rate of interest converted continuously and equivalent to a given effective rate 'r' is called

a) Simple interest

b) Compound interest

c) Force of interest

d) Continuous interest.

b) "The product of two negative real number is not negative" is given by.....

a. $\exists x \forall y ((x < 0) \wedge (y < 0) \rightarrow (xy > 0))$.b. $\forall x \forall y ((x < 0) \wedge (y < 0) \rightarrow (xy > 0))$.c. $\exists x \exists y ((x < 0) \wedge (y < 0) \wedge (xy > 0))$.

d. none of the above.

c) Which of the following is a variable cost.....

a. interest payments

b. raw materials

c. property tax

d. all the above

d) If $\int \frac{1}{(4x+5)^2} dx = f(x) + c$ then $f(x)$ is.....

a. 0
 b. $\frac{-1}{(4x+5)}$
 c. $\frac{-15}{2} (4x + 5)^{-2}$
 d. $(4x + 5)^{-3}$

e) According to Boolean law: $a + 1 = \dots\dots\dots$

a. 1
 b. a
 c. 0
 d. a'

4. State True or False

a) Compound interest acquired is always greater than the simple interest.

b) $p \wedge \sim p$ is a tautology.

c) The crucial value of η_d is 1.

d) The reverse process of differentiation is called integration.

e) a' is a unique element.

SECTION B - K3 (CO2)

Answer any TWO of the following (2 x 10 = 20)

5. A sum of Rs.1000 is invested for 5 years at 12% interest per year. What is the simple interest?. If the same amount had been invested for the same period at 10% per annum compound interest compounded per year, how much more interest would be get?

6. Show that P is equivalent to $\sim(\sim P), (P \wedge P), (P \vee P), P \wedge (P \vee Q), (P \wedge Q) \vee (P \wedge \sim Q)$ using truth table.

7. A demand function is given by $p = \sqrt{100 - x^2}$ and the supply function is given by $x = 2p - 10$, where p is price and x is quantity. Calculate elasticities of demand and supply at equilibrium price.

8. Evaluate $\int \frac{dx}{x-x^3}$ by using partial fractions.

SECTION C - K4 (CO3)

Answer any TWO of the following (2 x 10 = 20)

9. Reframe the following statements with its converse, inverse and contrapositive:
 i) If x and y are numbers such that $x = y$ then $x^2 = y^2$.
 ii) If a quadrilateral is a square then it is a rectangle.

10. The unit demand function is $x = \frac{1}{3}(25 - 2p)$, where x is the number of units and p is the price. Let the average cost per unit be Rs. 40. Determine the maximum profit.

11. Evaluate $\int \frac{(3x+7)}{2x^2+3x-2} dx$.

12. Calculate the value of Boolean function $(x \cap y) \cup [(x \cup y') \cap y]'$ using the truth table.

SECTION D - K5 (CO4)

Answer any ONE of the following (1 x 20 = 20)

13. a. Find the amount for each of the following to which Rs.100 will accumulate.
 (i) At the rate of interest 12% per annum compounded quarterly for 10 years.
 (ii) At the force of interest 3% per annum for 3.5 years.
 (iii) At the effective rate of interest 3% per annum for 10 years, 4% per annum for 4 years and 5% per annum for 2 years.
 (iv) At the rate of interest corresponding to 3% per annum effective rate of discount for 8 years.

b. Decide which of the following statements are true and which are false. Briefly validate your answer.

i) If $1 = 1$, then most horses have 4 legs.

ii) If $0 = 1$, then $1 = 1$.

iii) If 8 is an odd number, then the 7624th digit of π is a prime number.

iv) If $\sqrt{-1}$ is i , then $2 + 2 = 5$.

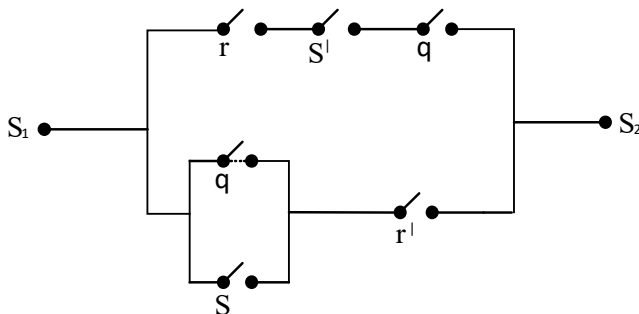
- 14. a.** Let the cost function of a firm be given by the following equation:
 $C = 300x - 10x^2 + \frac{1}{3}x^3$, where C stands for cost and x for output. Estimate
- i) the output at which marginal cost is minimum.
 ii) the output at which average cost is minimum.
 iii) the output at which average cost is equal to marginal cost.
- b.** Explain any five properties of definite integrals.

SECTION E – K6 (CO5)

Answer any ONE of the following **(1 x 20 = 20)**

- 15. a.** A machine, costing Rs.20,000 is sold for Rs.5000 down and the balance payable in semi-annual instalments in the next five years. Compare the instalment if interest is:
- (i) 4% compounded semi-annually?
 (ii) 4% compounded annually?
- b.** Apply substitution method to find the value of the integration $\frac{x^3}{(x^2+1)^3}$ with respect to x .

- 16.** Indicate the network and construct the truth table for the network, simplify and give a simpler network.



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