LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Com. DEGREE EXAMINATION – **COMMERCE**

FOURTH SEMESTER – **NOVEMBER 2024**

UMT 4401 – MATHEMATICS FOR COMMERCE

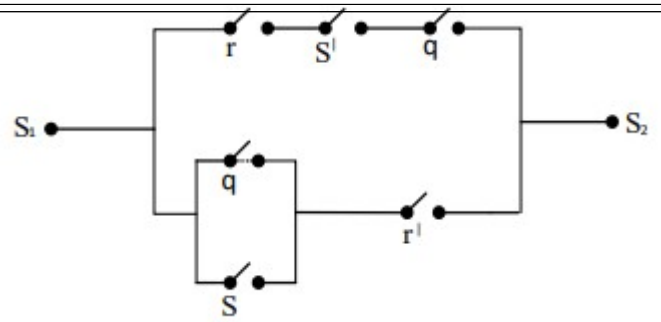
Date: 11-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

	SECTION A - K1 (CO1)	
	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**Answer the following**	
a)	Define the effective rate of interest.	
b)	What is quantifier?	
c)	Describe elasticity of demand.	
d)	Illustrate consumer surplus.	
e)	Define Idempotent Law.	
2.	**Fill in the blanks**	
a)	The formula for continuous compounding is $A=Pe^{rt}$ where A represents the accumulated amount, P is the principal, r is the rate of interest, and t is the _____.	
b)	"If P then Q" statement type is called a _____ statement.	
c)	Equilibrium is the point where the quantity demanded equals the _____.	
d)	The formula for consumer surplus is given by the definite integral of the demand function minus the _____ price over a specified quantity.	
e)	If $x \in B$, where B is a Boolean Algebra then $x \cup x =$¿.	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**MCQ**	
a)	If the nominal interest rate is 8% per annum compounded quarterly, what is the effective annual interest rate? (i) 8% (ii) 8.24% (iii) 8.16% (iv) 8.30%	
b)	The negation of the statement "If it rains, the ground is wet" is: (i) If it doesn't rain, the ground is not wet. (ii) It rains and the ground is not wet. (iii) It doesn't rain or the ground is wet. (iv) If the ground is wet, it rains.	
c)	If the marginal cost (MC) is greater than the average cost (AC), then (i) AC increases (ii) AC decreases (iii) AC stays constant (iv) AC first increases then decreases	
d)	Find the value of the definite integral $\int_0^2 (3x^2+2x)dx$. (i) 10 (ii) 14 (iii) 18 (iv) 22	
e)	The dual of $a.(b+c)=(a.b)+(a.c)$ is (i) $a+(b\cdot c)=(a+b)\cdot(a+c)$ (ii) $a+(b+c)=(a+b)\cdot(a+c)$ (iii) $a+(b\cdot c)=(a+b)+(a+c)$ (iv) $a\cdot(b+c)=(a+b)\cdot(a+c)$	
4.	**True or False**	
a)	The force of interest remains constant for all types of interest calculations.	
b)	A compound statement can be made by combining two simple statements using connectives like "and" or "or".	
c)	The marginal cost curve always intersects the average cost curve at its minimum point.	
d)	The amount of annuity increases with the number of payments made over time.	
e)	If $a, b \in B$, where B is a Boolean Algebra then $(a.b)'=a'+b'$.	
	SECTION B - K3 (CO2)	

Answer any TWO of the following	**(2 x 10 = 20)**
5.	Mr Shankar deposited Rs.10,000 in a bank for 3 years offering interest at the rate of 6% compounded half-yearly during first year, at the rate of 12% compounded quarterly during second year and at 10% compounded continuously during 3rd year. Calculate his balance after 3 years.

6.	Consider the statement, "If you give me a cow, then I will give you magic beans." Decide whether each statement below is the converse, the contrapositive, or neither. (i) If you give me a cow, then I will not give you magic beans. (ii) If I not give you magic beans, then you will not give me a cow. (iii) If I give you magic beans, then you will give me a cow. (iv) If I give you magic beans, then you will not give me a cow. (v) If you don't give me magic beans then I don't give you a cow.
7.	A demand function is given by $p=\sqrt{100-x^2}$ and the supply function is given by $x=2\,p-10$, where *p* is price and *x* is quantity. Calculate elasticities of demand and supply at equilibrium price.
8.	Explain briefly about conditional statement with examples.
	SECTION C – K4 (CO3)
Answer any TWO of the following	**(2 x 10 = 20)**
9.	Using truth table find the value for the Boolean function $(x \cap y) \cup \left[(x \cup y') \cap y\right]'$.
10.	Verify Euler's theorem for $u=x^n \log \frac{y}{x}$.
11.	Find the consumer surplus and producer surplus under pure competition for demand function $p=\frac{8}{x+1}-2$ supply function = $\frac{1}{2(x+3)}$, where p is the price and x is the quantity.
12.	Calculate $I=\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx$.
	SECTION D – K5 (CO4)
Answer any ONE of the following	**(1 x 20 = 20)**
13.	Find for each of the following, the amount 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.
14.	Let the cost function of a firm be given by the following equation $C=300\,x-10\,x^2+\frac{x^3}{3}$, where C stands for cost and x for output. Calculate (i) Output, at which marginal cost is minimum. (ii) Output, at which average cost is minimum. (iii) Output, at which average cost is equal to marginal cost.
	SECTION E – K6 (CO5)
Answer any ONE of the following	**(1 x 20 = 20)**
15.	(a) 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 even number, then the 7624th digit of 0 is a prime number. (iv) If 7624th digit of 0 is a prime number, then 2 + 2 = 4. (b) Integrate $\int \frac{(3x+7)}{2x^2+3x-2}\,dx$. (10+10)
16.	Indicate the network and construct the truth table for the network, simplify and give a simpler network.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