

- (iii) Examine if the function $y = x^6 + 5$ is monotonic. Find $\frac{dX}{dY}$ by applying the Inverse function rule.
- 4 + 3 + 3

2017

ECONOMICS

[Honours]

(CBCS)

[First Semester]

PAPER — C2T

Full Marks : 60

Time : 3 hours

*The figures in the right-hand margin indicate marks**Candidates are required to give their answers in their own words as far as practicable**Illustrate the answers wherever necessary*

GROUP—A

1. Answer any ten questions from the following : 2 × 10

- (a) How is continuity of a function $f(x)$ at $x = a$ defined ?
- (b) What do you mean by the statement that indifference curves are convex to the origin ?

(2)

- (c) Distinguish between a local maximum and the global maximum of a function.
- (d) Let $y = \log x$ and $x = 2 + 3z + 5z^2$ find dy/dz .
- (e) Define expectation of a random variable.
- (f) In how many ways can the letters of the word ECONOMICS be arranged?
- (g) Write the probability density function of a normal random variable with mean μ and variance σ^2 .
- (h) What do you mean by a polynomial function? Give an economic example.
- (i) Define sample space.
- (j) What are the axioms of probability theory?
- (k) Define Independent events.
- (l) Distinguish between ordered pairs and unordered pairs.
- (m) What is a rational function? Give an economic application of it.

(3)

- (n) If the Average Revenue function $AR = 46 - 3Q^2$, find the Marginal Revenue MR .

- (o) Find the elasticity of demand if the demand function is $Q = 62 - 3P^2$ at $p = 4$.

GROUP-B

Answer any four questions from the following : 5 × 4

- 2. Using Venn diagram show that $\{(A \cup B) \cap C\} = (A \cap C) \cup (B \cap C)$
- 3. What is the probability of getting a total of 10 points in three throws of a balanced dice?
- 4. With usual notation, prove that $P(A + B) = P(A) + P(B) - P(A \cap B)$
- 5. The marginal cost function of a company is given by $MC = 75 + 20x - 3x^2$. Find the total cost function when fixed cost is Rs. 1000.
- 6. Suppose, the demand curves is $P = f(Q) = 50 - 0.1 Q$ and the supply curve is $P = g(Q) =$

(4)

0.2 $Q + 20$. Find the equilibrium price and output. Compute the consumer's surplus and producers' surplus.

7. Define the point of inflexion. Find the point of inflexion for the following function :

$$Y = X^3 + 5X^2 + 3X + 9$$

GROUP - C

Answer any two questions from the following : 10×2

8. State and prove the Bayes' theorem of probability. There are three boxes containing white and black balls as shown in the table below :

	No. of white balls	No. of black balls
Box 1	4	6
Box 2	3	5
Box 3	5	2

A box is chosen at random and a ball is drawn from that. It is found to be white. What is the probability that Box 3 was chosen ? $5 + 5$

(5)

9. Distinguish between a difference equation and a differential equation. Given the demand and supply functions for the Cobweb model as follows, find the intertemporal equilibrium price, and examine whether the equilibrium is stable or not $4 + 6$

$$Q_d = 18 - 3P_t \text{ and } Q_s = 3 + 4P_{t-1}$$

10. Define first and second order conditions of maximisation of a function $y = f(x)$. The revenue $R(Q)$ and cost $C(Q)$ functions of a firm are $R(Q) = 1200Q - 2Q^2$ and $C(Q) = Q^3 - 16.25Q^2 + 1528.5Q + 2000$. Find the profit maximising output and the maximum profit of the firm. $4 + 6$

11. (i) If $Y_i = a + bX_i$, prove that

$$E(y^2) = a^2 + 2abE(X) + b^2E(X^2)$$

(ii) Evaluate

$$\int_2^5 e^{2x} dx$$