(f) A production function is given as follows : $Q=AK^{\alpha}L^{\beta}$, where A is a positive constant, Q, K and L represent output, capital and labour respectively and α,β are. positive fractions with $\alpha+\beta<1$. (i) Prove that the function is homogeneous with decreasing returns to scale. (ii) Find out the output elasticity with respect to labour.

Unit–III

3. Answer **any *one*** question : 10×1=10

(a) If marginal revenue (MR)=16–X^2, find the quantity level where the total revenue will be maximum. Also find the total and average revenue and demand curves. 4+4+2

(b) Given the utility function U=4xy–y^2, and, the budget equation, 2x+y=6, where, 'U' denotes utility, x and y denote the consumption levels of two commodities, (i) write down the Lagrangian function for utility maximisation, mentioning the Lagrange multiplier. (ii) Find the optimal level of purchase of x and y. (iii) Check the sufficient condition with the help of Bordered Hessian determinant. 2+5+3

B.Sc. 1st Semester (Honours) Examination-2022-23

ECONOMICS

Course ID : 11612 Course Code : UG/ECO/102/C-2

Course Title : Mathematical Methods in Economics–I (New)

Time : 2 Hours *Full Marks :* 40

The figures in the right hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Unit–I

1. Answer **any *five*** questions : 2×5=10

(a) Explain the concept of universal set with a suitable example.

(b) If a consumption function is represented by C=500+0·25Y, Where C and Y represent aggregate consumption and aggregate income respectively, Find the saving function.

(c) Given the sets $S1=(2,4,6)$, $S2=(7,2,6)$ and $S3=(4,2)$.

Find (i) $S1 \cup S2 \cup S3$ and (ii) $S1 \cap S2 \cap S3$

(d) Given AR = 60–3Q Find TR and MR functions.

(e) Find the common difference of $\sqrt{12}, \sqrt{27}, \sqrt{48}$.

(f) Find the sum of all integers between 100 and 1000 which are divisible by 9.

(g) In a market the demand and supply functions are given as follows :

D=30–40P; S=21+5P. Find out the equilibrium price.

(h) Give one example, each of decreasing function and constant function from economic theory.

Unit–II

2. Answer **any *four*** questions : 5×4=20

(a) Use Cramer's rule and solve the following National Income Model : Y=C+Io+Go; C=a+bY, where, Y and C represent levels of national income and aggregate consumption expenditure and Io and Go represent autonomous investment and government expenditure.

(b) Given the demand function Q=700–2P+0·02Y, where, price P=25 and income Y=5000, find the income elasticity of demand. State whether the commodity is normal or inferior.

(c) The demand curve is P=20–3Q; find the consumer surplus at $P_0=8$ and explain it graphically.

(d) Find out the relationship between average revenue (AR), marginal revenue (MR) and Price elasticity of demand (e). What will be the value of MR at $|e|=1$?

(e) Given the average cost function, $AC=Q^2-5Q+60$, (i) find out the output level where AC is minimum. (ii) find out the MC function.