

END TERM EXAMINATION

FIRST SEMESTER [BCOM(HONS)] JANUARY-FEBRUARY 2023

Paper Code: BCOM105 Subject: Quantitative Techniques for Commerce

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions. All questions carry equal marks.

- Q1 In a certain cities there are 25 colleges and 100 schools, Each school and college has 5 peons, 2 clerks and 1 cashier. Each college in addition has 1 accountant and 1 head-clerk. The monthly salary of each of them is as follows:
Peon - Rs. 3000; Clerk - Rs. 5000; Cashier - Rs. 6000; Accountant - Rs. 7000 and Head-Clerk - Rs. 8000.
Using the matrix notation, find
- a) The total number of posts of each kind in schools and colleges taken together.
- b) The total monthly salary bill of each school and college separately.
- c) The total monthly salary bill of all the schools and colleges taken together.
- Q2 a) Find the number of combinations that can be made by taking 4 letters of the word COMBINATION.
- b) If a, b, c, d are in G.P., prove that a+b, b+c, c+d are also in G.P.
- Q3 a) The average cost function (AC) for a commodity is given by
 $AC = x + 5 + 36/x$
in terms of the output x. Find the output for which AC is increasing and the output for which AC is decreasing.
Also find the total cost C and the marginal cost (MC) as function of x.
- b) Find the elasticity of demand for the demand function:
 $x = 27/p^3$
where x is the demand of a commodity at a price p.
- Q4 a) Demand and supply functions are:
 $D(x) = (12 - 2x)^2$
and $S(x) = 56 + 4x$ respectively. Determine consumer surplus under monopoly (so as to maximize the profit) and the supply function is identified with the marginal cost function.

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- b) After producing 35 units, the production manager of a company determines that its production facility is following a learning curve of the form:
 $f(x) = 1000 x^{0.5}$
 where $f(x)$ is the rate of labour hours required to assemble the x th unit. How many total labour hours should they estimate are required to produce an additional 25 units.
- Q5 a) A company whose annual sales are currently Rs. 500000 has been experiencing sales increase of 20% per year. Assuming this rate of growth continues, what will be the annual sales in five years?
- b) the marginal cost function of manufacturing x shoes is $6 + 10x - 6x^2$. The total cost of producing a pair of shoes is Rs. 12. Find the total and average cost function.
- Q6 Suppose the demand and total cost functions of a monopolist are $p = 20 - 4x$ and $TC = 4x + 2$ respectively, where p is price and x is quantity. If the government impose tax at the rate of 20% of sales, determine the total tax revenue that the government will be able to collect.
- ✓ Solve the following linear equation model with the help of simplex method:
 Maximize $Z = 500X_1 + 150X_2$
 Subject to
 $X_1 + X_2 \leq 60$
 $2500X_1 + 500X_2 \leq 50000$
 Also, $X_1, X_2 \geq 0$
- Q8 What is duality? What are its objectives? Explain the procedure of finding out a dual for a primal problem with the help of an example.
