

(4)

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that in 2006, the number of passengers was 2,50,000 and in 2012, the number of passengers was 2,20,000. If ' n ' represents the number of passengers using the airline per year, and ' t ' indicates the time in years. (CO2)

- (i) Model the number of passengers using the airline as a function of time.
- (ii) What is the number of riders expected in the year 2020 ?
- (iii) It is estimated that the airline will go out of business if the ridership falls below 20,000. According to your analysis, when will this happen ?

OR

- (b) Find maximum and minimum values of the function $f(x) = 2x^3 - 24x + 107$ in the interval $[1, 3]$. (CO2)

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**B. COM. (HONS.) (FIRST SEMESTER)
MID SEMESTER**

EXAMINATION, Jan., 2023

BUSINESS MATHEMATICS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) If $A = \begin{bmatrix} 1 & 3 & 1 \\ 3 & 2 & 4 \\ 5 & 8 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & 5 \\ 3 & 2 & 7 \\ 5 & 8 & 0 \end{bmatrix}$

then show that $(AB)^T = B^T A^T$. (CO1)

OR

- (b) Find the inverse of matrix : (CO1)

$$\begin{bmatrix} 4 & 6 & 8 \\ 5 & 9 & 3 \\ 1 & 7 & 2 \end{bmatrix}$$

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2. (a) Two mobile service providers S_1 and S_2 currently enjoy the market share 53% and 47% respectively. Every month each of the service providers bring out new schemes and brand switching takes place as given in the following matrix. What is the share of S_1 and S_2 after one month? When is the equilibrium established? (CO1)

	S_1	S_2
S_1	0.42	0.58
S_2	0.28	0.72

OR

- (b) By applying the properties of determinants show that: (CO1)

$$\begin{vmatrix} p+q & q+r & r+p \\ r & p & q \\ 1 & 1 & 1 \end{vmatrix} = 0$$

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3. (a) Find the domain of the following function $x \in \mathbb{R}$. (CO2)

(i) $y = \frac{1}{(x-3)(x-5)}$

(ii) $y = \sqrt{5-2x}$

OR

- (b) If $f(x) = x^2 + 5x + 10$, for what values of 'x' $2f(x) = f(2x)$? (CO2)

4. (a) If the total cost function:

$$TC = 11x - 2x^2 + \frac{x^3}{2},$$

identify the level of output at which average cost will be minimum. (CO2)

OR

- (b) (i) Find the derivative of function:

$$f(x) = 2x^3 + e^{x^4} - \log_e x^5$$

- (ii) If the demand function $D = 20 - 3Q$. Find the marginal revenue when level of output produced Q is 3. (CO2)

5. (a) The ridership of Yatra airlines has been decreasing at a linear rate. Data reveals

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