15/12/23

**DOON UNIVERSITY, DEHRADUN**
**End Semester Examination, 1ˢᵗ Semester, 2023**
**Academic Year 2023-24 (Odd Semester)**
**School of Social Sciences, Department of Economics**
**Programme Name: B.Sc. Economics**
**Course Code with Title: ECC103-Mathematics-I**

*Time Allowed: 2.00 Hours*                               *Maximum Marks: 50*

*INSTRUCTIONS:*

1. *There are three sections.*
2. *Section A consists of five questions. All questions are compulsory in this section.*
3. *Section B consists of four questions. Each question carries five marks in this section.*
4. *Section C comprises three questions. Attempt any two questions. Each question carries ten marks in this section.*
5. *Any candidate found using a calculator during the examination will face immediate disqualification and potential disciplinary actions.*

*SECTION: A -All questions are compulsory (5\*2 =10 marks)*

**Ques 1**. Define scalar matrix.
**Ques 2**. Evaluate $\int e^{2x}\, dx$
**Ques 3**. Find x when $\begin{bmatrix} x^2 & 5 \\ 3 & 3 \end{bmatrix} = 12$

**Ques4**. Verify $B' A' = (AB)'$ When

$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 0 \end{bmatrix}$  $B = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ -1 & 1 \end{bmatrix}$

**Ques5**. Differentiate the following with respect to x:

$(x+4)(x^2+1)(x^3-5x)$

*SECTION: B- All questions are compulsory (4\*5= 20 marks)*

**Ques 6.** Differentiate the following with respect to x

$\dfrac{x^2+2x+1}{x^2-2x+1}$

**Ques 7.** A student has 4 places where he can have his lunch. The college canteen charges Rs. 9 for a cold drink, Rs. 6 for a cutlet and Rs. 5 for a sandwich. The coffee house charges Rs. 10. Rs. 8 and Rs. 9 for the same items, while the fast food joint charges Rs. 12, Rs. 15, and Rs. 15, and the restaurant

charges Rs. 15, Rs. 25 and Rs. 20 for the above items respectively. The student wants to have one cold drink, two cutlets, and one sandwich.
Where should he have his lunch so that the lunch costs him the least? (Use of Matrix-Algebra is required)

**Ques 8.** If A=$\begin{bmatrix} 9 & 1 \\ 4 & 3 \end{bmatrix}$ B=$\begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$ , find the matrix X so that

$3A+5B+2X=0$

**Ques 9.** If $y = x^3 \log\frac{1}{x}$ ,

then show that $\dfrac{d_y^2}{d_{x^2}} - \dfrac{2}{x}\dfrac{dy}{dx} + 3x = 0$

### SECTION: C- Attempt any two (2*10=20 marks)

**Ques 10.** If $y = (\log x)^x + x^{\log x}$ ; then find $\dfrac{dy}{dx}$.

**Ques 11.** Evaluate the following determinant:

$\blacktriangle = \begin{vmatrix} \log_3 5/2 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix}$

**Ques 12.** What is matrix? What are different types of matrices?