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AA847

M. Sc. EXAMINATION, May 2019

(First Semester)

(B. Scheme) (Re-appear)

ENVIRONMENTAL SCIENCE

ES113

Remedial Mathematics (for Biology Students)

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Find the equation of a line through the points (1, 2) and (3, 1). What is its slope ? What is its y intercept ? **10**

Unit IV

7. For the vector, $a + i + 2j + 2k$ and $b = 2i + 3j + k$, obtain :

(i) The vector product $a \times b$.

(ii) The area of the parallelogram formed by the two vectors a and b. **20**

8. (a) Find unit vector in the direction of vector $a = 2i + 3j + k$. **10**

(b) Solve the following equation : **10**

$$\frac{5}{2y-6} = \frac{10-y}{y^2-6y+9}$$

(b) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that : **10**

$$A^2 - 5A + 71 = 0$$

2. Solve the following system of equations by elimination : **20**

$$2x_1 + 3x_2 + 2x_3 = 3$$

$$4x_1 - 5x_2 + 5x_3 = -7$$

$$-3x_1 + 7x_2 - 2x_3 = 5$$

Unit II

3. Differentiate each of the following functions :

(a) $W(z) = \dfrac{3z+9}{2-z}$

(b) $h(x) = \dfrac{4\sqrt{x}}{x^2-2}$ **20**

4. (a) For given matrix $\begin{bmatrix} 1 & 6 & 5 \\ 2 & 3 & 1 \\ 0 & 2 & 4 \end{bmatrix}$ calculate the determinant. **10**

(b) Show that the vectors $a = i + 3j + 4k$ and $b = -2i + 6j - 4k$ are perpendicular. **10**

Unit III

5. (a) If $x = 4z^2 + 5$, $y = 6z^2 + 7z + 3$, find $\dfrac{d^2y}{dx^2}$. **10**

(b) If $y = (x^2 + 1)^2 \sqrt{2x-5}$; find $\dfrac{dy}{dx}$. **10**

6. (a) If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then verify that $A' A = I$. **10**

(b) Express the matrix as the sum of a symmetric and a skew symmetric matrix : **10**

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$