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Roll No.....

B.Sc.(Micro.)-II Yr.

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B.Sc.(Micro.) Examination, May 2017

Bio-Mathematics

(B-207)

Time : Three Hours / [Maximum Marks : 40

Note : Attempt any five questions. Each question carries equal marks. Calculators and type of tables are allowed.

1. (a) If $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$,

then find the value of (a-2b). 4

(b) If $A = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 & 1 \\ 6 & 8 & 4 \end{bmatrix}$,

find AB and BA whichever exists. 4

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2. (a) Using properties of determinants, prove that 4

$$\begin{vmatrix} 0 & ab & ac^2 \\ a^2b & 0 & bc^2 \\ a^2c & cb^2 & 0 \end{vmatrix} = 2a^3b^3c^3$$

(b) Use matrix method to show that the system of equations 4

$$2x + 5y = 7$$

$$6x + 15y = 13$$

is inconsistent.

3. Find the real root of the equation $x^3 - 9x + 1 = 0$ by Regular Falsi method. 4

4. (a) Find the real root of the equation $x^2 - 5x + 2 = 0$

by Newton Raphson's method. 4

(b) By Gauss Elimination method solve the following system of linear equations :

$$5x - y - 2z = 142 \quad 4$$

$$x - 3y - z = -30$$

$$2x - y - 3z = -50$$

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5. (a) Prove that 4

$$\left(\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} \right)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$$

(b) Show that 4

$$\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$$

6. (a) Prove that 4

$$\frac{1 - \cos A}{\sin A} = \tan \frac{A}{2}$$

(b) Show that 4

$$\frac{\sin^2 A - \sin^2 B}{\sin A \cos A - \sin B \cos B} = \tan(A + B)$$

7. (a) Differentiate $\tan \sqrt{x}$. 4

(b) For $\cos(x+y) = y \sin x$ 4

find $\frac{dy}{dx}$.

8. (a) If $x = a(t + \sin t)$ 4
 $y = a(1 - \cos t)$,

Find $\frac{dy}{dx}$.

(b) If $u = \log(x^2 + y^2)$, prove that 4

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

9. (a) Evaluate 4

$$\int \frac{dx}{1 + \sin x}$$

(b) Evaluate $\int x \sec^2 x \, dx$ 4

10. (a) Evaluate $\int \frac{(2x + 3)}{(x - 3)(x + 1)} \, dx$ 4

(b) Show that $\int_0^{\pi/2} \log(\tan x) \, dx = 0$. 4