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(2123)

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**B. Pharmacy 1st Semester Examination**

**Remedial Mathematics (N.S.)**

**BP-116**

**Time : 3 Hours**

**Max. Marks : 70**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

- Note :** (i) Attempt any Two questions from Section-A.  
(ii) Attempt any Eight questions from Section-B.  
(iii) Attempt ALL questions from Section-C.

**SECTION - A**

1. (a) For what value of ' $\lambda$ ' is the function,

$$f(x) = \begin{cases} \lambda(x^2 - 2x), & \text{if } x \leq 0 \\ 4x + 1, & \text{if } x > 0 \end{cases}$$

is continuous at  $x = 0$ ?

(b) If  $x^y = e^{x-y}$ , Prove that  $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$  (10)

2. (a) Integrate,  $\int \frac{x^2 \cdot dx}{(x^2 + 1)(x^2 + 4)}$

(b) Prove that  $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$  (10)

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[P.T.O.]

3. (a) Solve by matrix method, the following system of equations:

$$x + 2y + z = 7$$

$$x + 3z = 11$$

$$2x - 3y = 1$$

- (b) Solve  $2^{x+1} + 4^x = 8$  (10)

### SECTION - B

4. Show that  $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz(x-y)(y-z)(z-x)$

5. Show that  $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$  satisfies the equation  $x^2 - 6x + 17 = 0$ .

Hence, find  $A^{-1}$ .

6. Differentiate  $e^{\sqrt{x}}$  by delta method.

7. Integrate  $\int \frac{\sin 2x}{a^2 \sin^2 x + b^2 \cos^2 x} dx$

8. Evaluate  $\lim_{x \rightarrow 4} \frac{3 - \sqrt{5+x}}{1 - \sqrt{5-x}}$

9. If  $y = \sqrt{\frac{1+e^x}{1-e^x}}$ , show that

$$\frac{dy}{dx} = \frac{e^x}{(1-e^x)\sqrt{1-e^{2x}}}$$

10. Solve :  $\frac{2x+3}{x+1} + 6 \frac{x+1}{2x+3} - 7 = 0$

11. Evaluate :  $\int \frac{1}{x(x^4 + 1)} dx$

12. Let  $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$ . Find  $(AB)^{-1}$

13. Prove that  $\frac{\cos 2\theta}{1 + \sin 2\theta} = \tan\left(\frac{\pi}{4} - \theta\right)$  **(5×8=40)**

### SECTION - C

14. Define exponential function. Give one example.
15. Define limit of a function. Differentiate between limit of a function and value of function at a point by taking suitable example.
16. Define Transpose of a matrix. Give one example by taking a square matrix of order three.
17. Define derivative of a function at a point. Hence find  $f'(2)$ , when  $f(x) = x^2 + 1$ .
18. Write a quadratic equation whose sum of roots is 1 and product  $-12$ . What are those roots? **(2×5=10)**