

B. Pharmacy 1st Semester Examination
Remedial Mathematics (NS)
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) Prove that
- $$\begin{vmatrix} a+b+c & -c & -b \\ -c & a+b+c & -a \\ -b & -a & a+b+c \end{vmatrix} = 2(a+b)(b+c)(c+a) \quad (5)$$
- (b) Compute the inverse of matrix
- $$\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix} \quad (5)$$
2. (a) Differentiate the following function with respect to x:
- $$x^{\sin x} + (\sin x)^{\cos x} \quad (5)$$
- (b) Evaluate the limit
- $$\lim_{x \rightarrow 1} \frac{(2x-3)(\sqrt{x}-1)}{2x^2+x-3} \quad (5)$$
3. (a) Evaluate the integral
- $$\int \frac{x^3+x+1}{x^2-1} dx \quad (5)$$
- (b) In any triangle ΔABC , prove that
- $$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \quad (5)$$

SECTION - B

4. Evaluate the following limit
- $$\lim_{x \rightarrow 0} \frac{a^x - b^x}{x} \quad (5)$$

5. Solve the following system of linear equations by matrix method
- $$\begin{aligned} 3x - 2y &= 4 \\ 6x - 4y &= 10 \end{aligned} \quad (5)$$
6. If $\sin A = \frac{1}{2} \left(x + \frac{1}{x} \right)$, prove that $\sin 3A + \frac{1}{2} \left(x^3 + \frac{1}{x^3} \right) = 0$ (5)
7. Verify the identity $(AB)^{-1} = B^{-1}A^{-1}$ for the matrices
- $$A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix} \quad (5)$$
8. Evaluate the integral $\int \sin x \sin(\cos x) dx$. (5)
9. For what value of k, will the following equation has real and equal roots?
- $$kx^2 + kx + 1 = -4x^2 - x \quad (5)$$
10. Find the domain and range of the following function
- $$f(x) = \sqrt{(x-1)(3-x)} \quad (5)$$
11. If p and q are the roots of the equation $x^2 + px + q = 0$, then find out the value of p. (5)
12. If $A + B + C = \pi$ then prove that $\cos 2A + \cos 2B + \cos 2C = -1 - 4 \cos A \cos B \cos C$. (5)
13. Resolve $\frac{2x-3}{(x-1)(x^2+1)^2}$ into partial fraction. (5)

SECTION - C

14. Evaluate the integral $\int \frac{1}{\sin x - \cos x} dx$. (2)
15. Define symmetric and skew symmetric matrices. Also give the example of each. (2)
16. Define explicit and implicit function. (2)
17. If $x = a \cos \theta$, $y = b \sin \theta$ then find $\frac{d^2y}{dx^2}$. (2)
18. Define one-one and onto function. Also give the example of each. (2)