

9. (i) What is the difference between a matrix and a determinant?
- (ii) Given  $A = \begin{bmatrix} \sqrt{3} & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 4 & 3 \end{bmatrix}$   
Calculate AB.
- (iii) Calculate the value of  $\sin^2 75^\circ - \sin^2 15^\circ$ .
- (iv) What is the area of a triangle, whose co-ordinate of vertices are  $(-2, 0)$ ,  $(2, 0)$  and  $(0, 3)$ ?
- (v) Evaluate  $\int \log x \, dx$
- (vi) Differentiate  $\cos(e^{2x})$  w.r.t. x.
- (vii) Write equation of a straight line passing through the origin and making an angle of  $60^\circ$  with the direction of positive x-axis.
- (viii) Give an example of two matrices whose product is not defined.  $(2 \times 8 = 16)$

[Total No. of Questions - 9] [Total No. of Printed Pages - 4]  
(2124)

1671

B. Pharmacy 1st Semester Examination  
Mathematics-I (OS)  
HBP-103

Time : 3 Hours

Max. Marks : 80

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 :** Attempt five questions in all, selecting one question from each sections A, B, C and D. Section E is compulsory.

## SECTION - A

1. (a) Solve the equation  $x^3 + 2x^2 - 3x - 10 = 0$ , given that one root in an integer. (5)
- (b) Prove that
- $$\begin{vmatrix} a^2 + 1 & ab & ac \\ ab & b^2 + 1 & bc \\ ac & bc & c^2 + 1 \end{vmatrix} = 1 + a^2 + b^2 + c^2 \quad (5)$$
- (c) Solve the system of equations
- $$\begin{aligned} x + y + z &= 1 \\ x + 2y + 3z &= 6 \\ x + 3y + 4z &= 6 \end{aligned}$$
- by Cramer's rule. (6)
2. (a) Find the inverse of the matrix

$$\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

(8)

- (b) Solve the following system of equations by the metric method

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

$$3x + 4y - 5z = -5$$

$$2x - y + 3z = 12$$

(8)

## SECTION - B

3. (a) If  $\operatorname{cosec}\theta - \sin\theta = a^3$ ,  $\operatorname{sec}\theta - \cos\theta = b^3$  then prove that  $a^2b^2(a^2+b^2)=1$ . (6)

- (b) If  $\sin A + \cos B = n$  and  $\cos A + \sin B = m$  then prove that  $2\sin(A+B) = m^2 + n^2 - 2$ . (5)

- (c) If  $\sin A + \sin B = 1/4$  and  $\cos A + \cos B = 1/2$  then prove that  $\tan\left(\frac{A+B}{2}\right) = \frac{1}{2}$ . (5)

4. (a) Prove that following:

$$\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2 \sin x \quad (6)$$

(b)  $\cos(6A) = 32\cos^6 A - 48\cos^4 A + 18\cos^2 A - 1$  (5)

(c) If  $\cos \alpha + \cos \beta + \cos \nu = 0$  then  $\cos(3\alpha) + \cos(3\beta) + \cos(3\nu) = 12\cos\alpha\cos\beta\cos\nu$  (5)

## SECTION - C

5. (a) Find the equation of a line which is perpendicular to the line joining (4, 2) and (3, 5) and cuts off an intercept of length 3 on y-axis. (6)

- (b) The vertices of a quadrilateral are A(-2, 6), B(1, 2), C(10, 4) and D(7, 8). Find the equations of its diagonals. (5)

- (c) Find the equation of the straight line whose intercept on x-axis and y-axis are respectively thrice and twice of those by the line  $3x + 4y = 12$ . (5)

6. (a) Find the equation of the line passing through (3, 2) and perpendicular to the line  $x - 3y + 5 = 0$ . (6)

- (b) Find the point of intersection of the lines  $x+y=5$  and  $2x-y+3=0$ . (5)

- (c) Find the equation of the straight line bisecting the segment joining the points (4,4) and (8,6) and making an angle of  $45^\circ$  with the positive direction of the x-axis. (5)

## SECTION - D

7. (a) Evaluate  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{3x^2}$  (5)

- (b) Find  $\frac{dy}{dx}$  if  $x^y + y^x = (x+y)^{x+y}$  (6)

- (c) Differentiate with respect to x  $(x^a + a^x + ax + x^x + \log 2x)$  where a is a constant. (5)

8. Evaluate the following integrals:

(a)  $\int \left( \frac{x^3 - x - 2}{1 - x^2} \right) dx$  (5)

(b)  $\int x^2 e^{3x} dx$  (6)

(c)  $\int \frac{x^2 + 2x + 8}{(x-1)(x-2)} dx$  (5)