SECTION - E

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 $\cos\left(e^{2x}\right)$ w.r.t. x.

(vii) Write equation of a straight line passing through the origin and making an angle of 60° with the direction of positive x-axis.

(viii) Give an example of two matrices whose product is not defined. (2×8=16)

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

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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

$$x+y+z=1$$
$$x+2y+3z=6$$
$$x+3y+4z=6$$

by Cramer's rule. (6)

2. (a) Find the inverse of the matrix

$$\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix} \quad (8)$$

(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 $\operatorname{cosec}\theta - \sin\theta = a^3$, $\sec\theta - \cos\theta = b^3$ 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:

$$\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$$ (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° with the positive direction of the x-axis. (5)

SECTION - D

7. (a) Evaluate $\lim\limits_{x\to 0} \frac{1-\cos x}{3x^2}$ (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)

[P.T.O.]