2016/ODD/13/34/BPH–111 (C)/550

UG Odd Semester (CBCS) Exam., December—2016

PHARMACEUTICAL SCIENCE

(1st Semester)

Course No. : BPH–111 (C)

(Mathematics—I)

(Remedial)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Solve the following equations by using Cramer's rule : 6

$$x \quad y \quad z \quad 2$$
$$2x \quad y \quad 2z \quad 1$$
$$x \quad 2y \quad z \quad 1$$

(b) Define the following : 3+3+3=9

(i) Transpose of a matrix

(ii) Symmetric matrix

(iii) Skew symmetric matrix

2. *(a)* If

$$A \quad \begin{matrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & 1 & 4 \end{matrix}$$

then find

(i) $A \quad A^T$

(ii) $A \quad A^T$ 4

(b) If

$$A \quad \begin{matrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & 1 & 0 \end{matrix} , B \quad \begin{matrix} 2 & 4 & 5 \\ 3 & 6 & 7 \\ 1 & 2 & 1 \end{matrix}$$

$$\text{and } C \quad \begin{matrix} 1 & 1 & 2 \\ 2 & 1 & 3 \\ 1 & 4 & 2 \end{matrix}$$

then find

(i) $2A \quad 3B \quad C$

(ii) $5A \quad 4B \quad AB$ 3+3=6

(c) If $x \quad y \quad z \quad 0$, then show that

$$\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} \quad 0$$ 5

UNIT—II

3. (a) If $\tan A \quad \frac{1}{2}$ and $\tan B \quad \frac{1}{3}$, then find the value of $\tan(A \quad B)$. 4

(b) Prove that $\tan 15 \quad 2 \quad \sqrt{3}$. 6

(c) If $\sin \quad \sin \quad a$ and $\cos \quad \cos \quad b$, then show that

$$\cos(\quad) \quad \frac{b^2 \quad a^2}{b^2 \quad a^2}$$ 5

4. (a) If $A \quad B \quad C \quad 180$, then prove that

$$\tan A \quad \tan B \quad \tan C \quad \tan A \; \tan B \; \tan C$$ 6

(b) If

$$\tan A \quad \tan B \quad p \text{ and } \cot A \quad \cot B \quad q$$

then show that

$$\cot(A \quad B) \quad \frac{1}{p} \quad \frac{1}{q}$$ 6

(c) If

$$\tan A \quad \frac{x}{x \quad 1} \text{ and } \tan B \quad \frac{1}{2x \quad 1}$$

then show that $A \quad B \quad /4$. 3

UNIT—III

5. (a) Using distance formula, show that the points (5, –3), (9, 5) and (11, 9) are collinear. 4

(b) Find the area of the triangle formed by the vertices (–2, –3), (–1, 0) and (7, –6). 6

(c) If the equation

$$ax^2 \quad 3xy \quad 2y^2 \quad 5x \quad 5y \quad c \quad 0$$

represents two straight lines perpendicular to each other, find a and c. 5

6. (a) Find the combined equation of the lines whose separate equations are $2x \quad 4y \quad 2 \quad 0$ and $3x \quad y \quad 3 \quad 0$. 5

(b) Show that the equation

$$3x^2 \quad 7xy \quad 2y^2 \quad 5x \quad 5y \quad 2 \quad 0$$

represents a pair of straight lines. Also find the separate equation of the lines. 6

(c) Find the value of p if the lines represented by $px^2 \quad 5xy \quad 7y^2 \quad 0$ are perpendicular to each other. 4

UNIT—IV

7. *(a)* Find $\frac{dy}{dx}$, for the following : 2+2+2=6

(i) $ax^2 \quad 2hxy \quad by^2 \quad 0$

(ii) $\frac{x}{a} \quad \frac{y}{b} \quad 1$

(iii) $x^m \quad y^n \quad a^{m \quad n}$

(b) If $x \quad a\cos t$, $y \quad b\sin t$, where t is a variable parameter, then find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. 4

(c) Find $\frac{dy}{dx}$ for the following : 2½+2½=5

(i) $y \quad e^{(ax^2 \quad bx \quad c)}$

(ii) $y \quad \log \frac{1 \quad \sin x}{1 \quad \sin x}$

8. *(a)* Evaluate : 3

$$\underset{x \quad 0}{\mathrm{Lt}} \frac{1 \quad \cos 2x}{x^2}$$

(b) If $y \quad e^{(ax^2 \quad bx \quad c)}$, then find $\frac{d^2y}{dx^2}$. 3

(c) Find $\frac{dy}{dx}$, if $x \quad a(t \quad \sin t)$ and $y \quad a(1 \quad \cos t)$. 3

(d) If $xy \quad ae^x \quad be^{\quad x}$, prove that

$$x\frac{d^2y}{dx^2} \quad 2\frac{dy}{dx} \quad xy$$ 6

UNIT—V

9. *(a)* Evaluate the following integrals : 3+3=6

(i) $\frac{dx}{3x^2 \quad 2x \quad 5}$

(ii) $x^2e^x\, dx$

(b) Evaluate : 3

$$_1^4 \frac{dx}{\sqrt{5 \quad x}}$$

(c) Solve : 3

$$xy^2\frac{dy}{dx} \quad 1 \quad y^3$$

(d) Find the differential equation by eliminating a and b from $xy \quad ae^x \quad be^{\quad x}$. 3

10. *(a)* Evaluate : 3

$$\frac{(4x \quad 3)}{2x^2 \quad x \quad 1}\, dx$$

(b) Evaluate : 3+3=6

$$\frac{dx}{9 \quad x^2} \text{ and } {}_{0}^{/4} \sec^2 x\, dx$$

(c) Solve : 3

$$(1 \quad x^2)\frac{dy}{dx} \quad 2x(1 \quad y^2)$$

(d) Solve : 3

$$\frac{d^2y}{dx^2} \quad 6\frac{dy}{dx} \quad 8y \quad 0$$

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