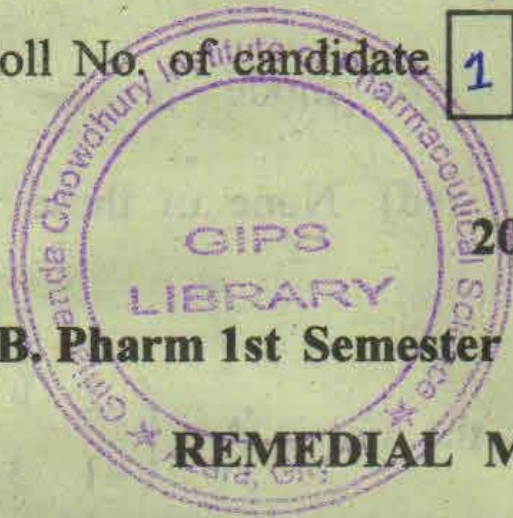


Total No. of printed pages = 9

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2014

B. Pharm 1st Semester End-Term Examination

REMEDIAL MATHEMATICS

Full Marks – 100 Pass Marks – 35 Time – Three hours

The figures in the margin indicate full marks for the questions.

1. For each of the following questions, four answers are provided of which one is correct. Choose the correct answer in each case. $1 \times 10 = 10$

(i) The quadratic equation $ax^2 + bx + c = 0$ has equal roots if

(a) $b^2 - 4ac = 0$

(b) $b^2 - 4ac > 0$

(c) $b^2 - 4ac < 0$

(d) None of these

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(ii) The value of the variable which has maximum frequency is known as

- (a) mean (b) mode
(c) median (d) None of these

(iii) For what value of k, the matrix $A = \begin{pmatrix} 2 & k \\ -1 & 3 \end{pmatrix}$ will be singular ?

- (a) 0 (b) -6
(c) 6 (d) None of these

(iv) If $A = \begin{pmatrix} 1 & 4 \\ -2 & 0 \end{pmatrix}$, then A^2 is equal to

- (a) $\begin{pmatrix} 1 & 16 \\ 4 & 0 \end{pmatrix}$ (b) $\begin{pmatrix} 2 & 4 \\ -4 & 8 \end{pmatrix}$
(c) $\begin{pmatrix} -7 & 4 \\ -2 & -8 \end{pmatrix}$ (d) None of these

(v) In which quadrant 1050° lies ?

- (a) First (b) Second
(c) Third (d) Fourth

(vi) Which of the following is positive ?

- (a) $\sin 240^\circ$ (b) $\cos 330^\circ$
(c) $\cos 120^\circ$ (d) $\tan 315^\circ$

(vii) Which of the following is possible ?

- (a) $\sin \theta = \frac{1}{4}$ (b) $\cos \theta = -2$
(c) $\sec \theta = 1/3$ (d) $\operatorname{cosec} \theta = \frac{1}{2}$

(viii) Which of the following is/are correct ?

(a) $\cos 2A = \cos^2 A - \sin^2 A$

(b) $\cos 2A = 1 - 2 \sin^2 A$

(c) $\cos 2A = 2 \cos^2 A - 1$

(d) All of the above.

(ix) Two lines will be parallel if

(a) $m_1 = m_2$

(b) $m_1 m_2 = -1$

(c) $m_1 + m_2 = 0$

(d) None of these

where m_1 and m_2 are the slopes of the two lines.

(x) Slope-intercept form of the line $Ax + By + C = 0$ is

(a) $\frac{x}{-C/A} + \frac{y}{-C/B} = 1$

(b) $y = -\frac{A}{B}x - \frac{C}{B}$

(c) $-\frac{A}{\sqrt{A^2+B^2}}x - \frac{B}{\sqrt{A^2+B^2}}y = \frac{C}{\sqrt{A^2+B^2}}$

(d) None of these.

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(4)

2. Answer the following questions : $2 \times 10 = 20 = 15$

(i) If one of the roots of the equation $2x^2 - kx + 8 = 0$ is two times the other, find the value of k .

(ii) Define triangular matrix.

(iii) If $A = \begin{pmatrix} 1 & 4 & 0 \\ 3 & -2 & 1 \\ 7 & 6 & -9 \end{pmatrix}$, find the transpose of

A, A^T .

(iv) What do you mean by 'empirical mode' ?

(v) Find $\frac{3\pi}{5}$ in sexagesimal system.

(vi) Prove that $\frac{1 - \cos \theta}{\sin \theta} = \frac{\sin \theta}{1 + \cos \theta}$

(vii) Express $\sin 7\theta - \sin 4\theta$ as product of t-ratios.

(viii) Prove that $\cos 2A = \cos^2 A - \sin^2 A$.

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(5)

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(ix) Find the distance between the points (5, -12) and (9, -9).

(x) What is the equation of the line which is parallel to $Ax + By + C = 0$?

3. Answer the following questions : $3 \times 10 = 30$

(i) Find the median from the following series : 0, 3, 4, 7, 9, 2, 11, 21.

(ii) Find x, y and z, given that

$$3 \begin{pmatrix} x & y \\ 0 & z \end{pmatrix} + \begin{pmatrix} x & 5 \\ -1 & 2z \end{pmatrix} = \begin{pmatrix} 4 & 17 \\ -1 & 3 \end{pmatrix}$$

(iii) If $3 + \sqrt{5}$ is a root of the equation $x^2 - px + q = 0$, show that $p : q = 3 : 2$.

(iv) If ABCD is a cyclic quadrilateral, show that

$$\cos A + \cos B + \cos C + \cos D = 0.$$

(v) Prove that $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = 2 \cos \theta$.

(vi) Show that $\cot 7\frac{1}{2}^\circ = \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$.

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(6)

(vii) For what value of k, the points (-1, 4), (-3, 8) and (-k+1, 3k) are collinear?

(viii) Find the equation of the line passing through (-4, -5) and perpendicular to the line joining (1, 2) and (5, 6).

(ix) Evaluate : $\lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{x^2 - x - 2}$

(x) Evaluate : $\int \sqrt{x} \, dx$.

4. Answer any five of the following questions :

$4 \times 5 = 20$

(i) If $A = \begin{pmatrix} 3 & 2 \\ 1 & 4 \end{pmatrix}$, find A^{-1} .

(ii) Show that

$$\begin{bmatrix} 2 \sin \theta & \cos^2 \theta & \sin^2 \theta \cos \theta \\ -2 \sin \theta & & \cos \theta \end{bmatrix} = 2 \sin \theta$$

(iii) Prove that $\cos 3A = 4 \cos^3 A - 3 \cos A$.

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(7)

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(iv) Reduce $x + \sqrt{3}y + 4 = 0$ to

(a) slope-intercept form and find its slope and y-intercept.

(b) intercept form and find its intercepts on the axes.

(v) Evaluate : $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

(vi) If $x^2 + y^2 + 6x - 16 = 0$, find $\frac{dy}{dx}$

when $x = 0$.

(vii) Evaluate $\int \frac{1}{1 + \cos x} dx$.

5. Answer any *four* of the following : $5 \times 4 = 20$

(i) If α and β are the roots of the equation $x^2 - px + q = 0$, then form the quadratic

equation whose roots are $\alpha + \frac{1}{\beta}$ and $\beta + \frac{1}{\alpha}$.

(ii) Find the mean and mode of the following frequency distribution :

Class : 0-10 10-20 20-30 30-40

Frequency : 4 8 7 5

(iii) Solve by Cramer's rule :

$$x + y + z = 3$$

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

$$x + 4y + 9z = 6$$

(iv) Find $\frac{dy}{dx}$ if $x = \frac{2a}{1+t^2}$, $y = \frac{2a^2}{1+t^2}$.

(v) Evaluate : $\int x \sec^2 x dx$.

(vi) If $y = x + \frac{1}{x}$, show that $x^2 \frac{dy}{dx} - xy + 2 = 0$.