

LH-111

Roll No.

Total No. of Questions : 10]

[Total No. of Pages : 03

Paper ID [PH112]

(Please fill this Paper ID in OMR Sheet)

B.Pharmacy (Semester - 1st)

REMEDIAL MATHS (PHM - 1.1.2) (M)

Time : 03 Hours

Maximum Marks : 80

Instruction to Candidates:

- 1) Section - A is compulsory.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Three** questions from Section - C.

Section - A

Q1)

(15 x 2 = 30)

- a) Distinguish between matrices and determinants.
- b) Show that (3, 1), (7,3) and (-3, -2) lie on the same straight line.
- c) Reducing the equation $5x + 2y + a = 0$ to slope-intercept form, evaluate its intercept and slope.
- d) Prove $\cos C - \cos D = 2 \sin \left(\frac{C+D}{2} \right) \cdot \sin \left(\frac{D-C}{2} \right)$.
- e) Solve $\log_{10} (2x - 1) + \log_{10} x = 1$.
- f) What are symmetric, scalar and singular matrices?
- g) A strip of 10 capsules has mean weight of 260 mg. If the mean of 6 capsules of these is 250 mg, then find the mean of the remaining capsules.
- h) Express all t-ratios of A in terms of sin A.
- i) Integrate $x^2 \log x$ with respect to 'x'.
- j) Differentiate x^2 from the first principles (ab initio).
- k) If $y = \log(\sin x)$, find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ and $\frac{d^3y}{dx^3}$.

l) Solve for x and y :

$$x + y = 5$$

$$x^2 + y^2 = 13$$

m) Differentiate between:

(i) Napierian and common logarithms.

(ii) Real and complex numbers.

n) Find the slope of a line whose inclinations are $\frac{\pi}{4}$ and $\frac{\pi}{6}$, respectively.

o) Differentiate between mean, mode and median.

Section - B

(4 x 5 = 20)

Q2) Given the co-ordinates of 3 vertices, derive the formula for finding area of a triangle. How can it detect collinearity? Using the formula, find the area of a triangle formed by (2, -3), (4, 6) and (3, 2).

Q3) A cylindrical reservoir containing an expectorant syrup measures 2.25 m in height and 3.64 m in external diameter. If it is made of 7 cm thick metal, find (i) how many cubic meters of syrup would be removed to lower the levels from 1.9 m to 1.2 m (ii) cost incurred on painting the inner surface @ Rs. 25-00 per m^2 .

Q4) If $\sin \alpha = \frac{15}{17}$ and $\cos \beta = \frac{12}{13}$, find the values of $\sin (\alpha + \beta)$, $\cos (\alpha - \beta)$ and $\tan (\alpha + \beta)$.

Q5) Differentiate (i) $\tan^{-1}\left(\frac{\sin x}{1 + \cos x}\right)$ (ii) $\frac{a}{x} + \frac{x}{a} + a^x + x^a + ax + a\sqrt{a} + x^a$

Q6) Find mean, median and mode from the following frequency table.

0 - 10	5
10 - 20	9
20 - 30	11
30 - 40	10
40 - 50	9
50 - 60	6

Section - C

(3 x 10 = 30)

Q7) (a) Show that the points (7, 3), (3, 0), (0, -4) and (4, -1) are the vertices of a rhombus.

(b) Solve using matrices on Cramer's rule:

$$x + y + z = 6$$

$$x + 2z - y = 5$$

$$3x + z + y = 8$$

Q8) Evaluate any three of the following integrals:

(a) $\int_0^{\pi/3} \frac{dx}{1 - \sin x}$

(b) $\int_{\pi/6}^{\pi/4} \tan \theta \, d\theta$

(c) $\int \frac{x \, dx}{(x-1)(x+2)}$

(d) $\int \frac{(t+1)(t+2)(t+3)}{(t-1)(t-2)(t-3)} \, dt$

(e) $\int_{-1}^1 \frac{e^x - e^{-x}}{e^x + e^{-x}} \, dx$

Q9) (a) Prove $\sin^2 A - \sin^2 B = \sin(A+B) \cdot \sin(A-B)$.

(b) Without expanding, prove that

$$\begin{vmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{vmatrix} \text{ vanishes.}$$

(c) Find the equation of a line passing through the centroid of a triangle formed by joining (2, -3), (4, 6) and (3, 2).

Q10)(a) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 \\ 1 & 2 \end{bmatrix}$

prove

(i) $5(A+B) = 5A + 5B$

(ii) $A - A'$ is Skew-symmetric

(iii) $B + B'$ is symmetric

(iv) A^{-1} is not equal to $-A$

(v) Both A and B are non-singular (vi) $AB \neq BA$

(b) If $x^y + y^x = a^b$, evaluate $\frac{dy}{dx}$.

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