Roll No. ....   Total Printed Pages - 4

F - 1314

B. Pharm. (Fourth Semester)
EXAMINATION, MAY-JUNE, 2022
Paper Fifth
APPLIED MATHEMATICS

Time : Three Hours]   *[Maximum Marks : 70*

Note : Attempt any five questions. All questions carry equal marks.

1. (A) Solve following equations by the matrix method:

   $$x + y + z = 6$$
   $$x - y + z = 2$$
   $$2x + y - z = 1$$

   (B) Find inverse of following matrix:

   $$A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 0 \\ 1 & 4 & 1 \end{bmatrix}$$

2. (A) Using properties of determinants, prove that

   $$\begin{bmatrix} 1 & 1 & 1 \\ \alpha & \beta & \gamma \\ \beta\gamma & \gamma\alpha & \alpha\beta \end{bmatrix} = (\alpha - \beta)(\beta - \gamma)(\gamma - \alpha)$$

   (B) Show that the equations

   $$x + 2y - z = 3$$
   $$3x - y + 2z = 1$$
   $$2x - 2y + 3z = 2$$
   $$x - y + z = -1$$

   are consistent and solve them.

3. (A) Calculate mean of the following data:

Number of Blood Sample	65	66	67	68	69	70	71	72	73
No. of Bacteria & found (in thousand)	1	4	5	7	11	10	6	4	2

   (B) Find median of the following distribution

No. of Patients	0-10	10-20	20-30	30-40	40-50
No. of Drugs used by them	22	38	46	35	20

4. (A) For the following distribution find lower and upper quartiles, fourth decile and both percentile:

Marks Gruop	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of Student	5	6	15	10	5	4	2	2

(B) Find mode of following distribution:

Class	14-15	16-17	18-20	21-24	25-29	30-34	35-39
Frequency	6	14	15	11	11	10	9

5. (A) If $\tan\theta = \dfrac{4}{3}$, find $\sin\theta$ and $\sin 2\theta$.

(B) If $\tan A = 2$, evaluate $\sec A \sin A + \tan^2 A - \cosec A$

6. (A) Prove that

$$\tan^2 A - \sin^2 A = \sin^4 A \cdot \sec^2 A$$

(B) Find amount for Rs. 10000 for 5 years at the rate 12% interest being compounded half yearly.

7. (A) Prove that the locus of a point, equidistant from two given points is the perpendicular bisector of the line segment joining the two points.

(B) In $\triangle ABC$, the bisector AX of $\angle A$ intersects BC at X. $XL \perp AB$ and $XM \perp AC$ are drawn. Is XL =XM? Why or why not?

8. (A) Prove that the median of a triangle divides it into two triangles of equal areas.

(B) Find equation of a straight line passing through two points (1, 0) and (0, 2).

9. (A) Verify that $\lim_{x \to 2} f(x) = 10$, where

$$f(x) = \frac{2(x^2 + x - 6)}{x - 2}, x \neq 2$$

(B) Evaluate $\int \cos^{-} x \, dx$

10. (A) If $\cos^{-1}\left(\dfrac{y}{b}\right) = \log\left(\dfrac{x}{n}\right)^n$, then show that

$$x^2 y_2 + xy_1 + n^2 y = 0$$

(B) Prove that

$$\int_0^{\pi/2} \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x} = \frac{\pi}{2ab}$$