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Total No. of Questions—17]

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1614

MATHEMATICS

PAPER—Second Term

Maximum Marks—50

Time Allowed—2½ Hours

Note : In case of failures/re-appear cases and fresh private candidates; i.e. candidates appearing for the first time after having passed Secondary School Examination, marks secured out of 50 shall be raised proportionately as if obtained out of 75.

Part A is compulsory for every student. In addition he/she should opt. for either **Part B** or **Part C**.

PART-A

1. The vertices of triangle ABC have coordinates (1, 1), (4, 5) and (6, 13) respectively. Find the angles A and B.

Or

Find the equation of the circle passing through the points (2, - 6), (6, 4) and (- 3, 1). Find its centre and radius.

2. (a) If ${}^{n+1}C_{r+1} : {}^nC_r : {}^{n-1}C_{r-1} = 11 : 6 : 3$, find the value of n and r.

Or

(a) Expand $(2 - 3x)^{-3}$ upto term containing x^4 . Also mention the condition for the validity of the expansion.

- (b) If ${}^{n+r+1}P_2 = 72$ and ${}^{n-r}P_2 = 12$, find n and r.

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(2)

3. (a) Show that the proposition $[(p \Rightarrow q) \wedge (q \Rightarrow r)] \Rightarrow (p \Rightarrow r)$ is a Tautology or not (construct the table).

- (b) Calculate the sum of the series :

$$1 + \frac{1+m}{2!} + \frac{1+m+m^2}{3!} + \frac{1+m+m^2+m^3}{4!} + \dots \text{ to } \infty.$$

Or

- (a) Show by using Truth value table that the compound statement $(\sim p \wedge q) \wedge r$ and $\sim [\sim (\sim p \wedge q) \vee \sim r]$ are equivalent.

- (b) Find the value of e^2 correct upto two decimal places.

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4. The vertices of a triangle are A(10, 4), B(- 4, 9) and C(- 2, -1). Find the equation of the altitude through B.

3

5. Find the equation of the parabola focus at (-1, -2), directrix is $x - 2y + 3 = 0$.

3

6. Find the M.D. about the mean for the following distribution :

Class-interval	Frequency
0-10	5
10-20	8
20-30	12
30-40	15
40-50	30
50-60	14
60-70	12
70-80	6

3

7. Find the radius and centre of the circle $4x^2 + 4y^2 - 10x + 5y + 5 = 0$.

3

8. Expand and simplify $(\sqrt{3} + 1)^6 - (\sqrt{3} - 1)^6$.

3

(3)

9. The coefficient of Mean Deviation is defined to be

(a) $M.D. \times \bar{x}$

(b) $\frac{M.D.}{\bar{x}}$

(c) $\frac{6^2}{\bar{x}}$

(d) $\frac{S.D.}{\bar{x}}$

1

10. Length of the Latus rectum of an ellipse is

(a) $4a$

(b) $\frac{2b^2}{a}$

(c) $\frac{2a^2}{b}$

(d) $\frac{b^2}{a}$

1

11. The equation $y = k$ is the equation of st. line

(a) Parallel to x-axis

(b) Parallel to y-axis

(c) Perpendicular to x-axis

(d) Perpendicular to y-axis.

1

PART-B

12. The mid-points of the sides of a triangle are $(1, 5, -1)$, $(0, 4, -2)$ and $(2, 3, 4)$. Find the vertices.

Or

Find the coordinates of the point where the line joining $(2, 4, 5)$ and $(4, -5, 2)$ is divided by yz-plane.

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P. T. O.

(4)

13. Prove by vector method that the line segment joining the mid-points of two sides of a triangle is parallel to and half of the third side. 3

14. If G is the centroid of triangle ABC, then $\vec{GA} + \vec{GB} + \vec{GC}$ equals to

(a) $3 \vec{GA}$

(b) $3 \vec{GB}$

(c) $3 \vec{GC}$

(d) '0' . .

PART-C

15. A company with 70,000 shares par value of Rs. 100 each, shows a Profit of Rs. 3,80,500. The directors announce an annual dividend of 5%. Find the total amount dividend paid by the Company.

Or

Find the 25th and 28th percentiles (i.e. P_{25} and P_{48}) from the following frequency distribution :

Weight (lbs)	Frequency
75-80	8
80-85	18
85-90	30
90-95	46
95-100	38
100-105	28
105-110	24
110-115	8

(5)

16. Calculate the Index number from the following data by using Simple aggregation method :

Commodity	Price in 1995 (in Rs.)	Price in 2002 (in Rs.)
Rice	12	18
Oil	30	45
Wheat	18	25
Cloth	20	30
Butter	50	70
Sugar	12	18

3

17. Find the Mode of the following data :

18, 24, 27, 16, 15, 13, 15, 23, 14, 15.

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