RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [2019-22] B.A./B.Sc. FIRST SEMESTER (July – December) 2019 Mid-Semester Examination, September 2019

Date : 18/09/2019 Time : 11 am – 12 noon **MATHEMATICS** (General)

Paper : I

Full Marks : 25

[1×4]

[2×3]

[3×5]

[Use a separate Answer Book for each group]

<u>Group – A</u>

Answer **<u>any one</u>** from question nos. **<u>1</u> and 2** :

1. Reduce the equation

 $7x^2 - 48xy - 7y^2 - 20x + 140y + 300 = 0$

to its canonical form and state the nature of the conic represented by it.

2. Show that the equation of the lines passing through the origin and perpendicular to $5x^2 - 7xy - 3y^2 = 0$ is $3x^2 - 7xy - 5y^2 = 0$.

Answer **any two** from question nos. **<u>3 to 5</u>** :

- 3. Find the equation of the bisectors of the angles between the lines $x^{2}-5xy+4y^{2}+x+2y-2=0$
- 4. If ax + by transformed to a'x' + b'y' under rotation of axes, then show that $a^2 + b^2 = a'^2 + b'^2$.
- 5. Find the equation of the director circle of the ellipse

$$\frac{x^2}{6} + \frac{y^2}{5} = 1$$

<u>Group – B</u>

Answer **any three** from question nos. 6 to 10 :

- 6. Solve $x^7 + x^4 + x^3 + 1 = 0$.
- 7. Express $\sin^4 \theta \cos^4 \theta$ in terms of cosines of multiples of θ .
- 8. Solve : $\cos z = 2$.
- 9. Solve: $4x^3 + 16x^2 9x 36 = 0$, where the sum of two of its roots being zero.
- 10. α, β, γ are the roots of $x^3 x^2 + 4x 1 = 0$. Find $\sum (\alpha \beta)^2$.

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