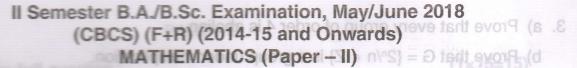
SM - 368

 $(5 \times 2 = 10)$



H = 0 and H =me: 3 Hours

Instruction : Answer all Parts.

Answer any five questions : ¹ dy = 0.

- a On the set Q, the set of all rational numbers other than 1, * is defined by (6.) $a * b = a + b - ab \forall a, b \in Q$. Find the identity element.
- The Prove that in a group G, $(a^{-1})^{+1} = a \forall a \in G$. (b) a = 1 solutions of that the third of the formula of the third of the theorem (d) is the third of the theorem (d) is theorem (d) is theorem (d) is theorem (d) is theorem (d) is
- End the angle between the radius vector and the tangent to the curve c) Show that the evaluate of the parabola $y^2 \neq 4ax$ is $27ay^2 = 4$ for $\frac{1}{2} = 1$
- d. Find the length of the polar subtangent for the curve $r = a \sec 2\theta$.
- = Find the asymptotes parallel to the coordinate axes for $(x^2 + a^2) y = bx^2$.
- Find the length of an arc of the cycloid $x = a (\theta + \sin\theta)$, $y = a (1 \cos\theta)$.
- Show that the equation $(x^2 2xy + 3y^2) dx + (y^2 + 6xy x^2) dy = 0$ is exact.
- c) Find the pedal equation of the curve $y^{2/3} + y^{2/3} = a^{2/3}$ m Solve : $P^2 - 4P + 3 = 0$ where P =
 - 6. a) Find all the asymptotes of the curve xb

 $2x^{3} - x^{2}y - 2xy^{2} + y^{3} - 4x^{2} + 8xy - 4x + 1 = 0.$

(21=21×1) the surface area of the solid generated by revolution :

- 2 a Let G be the set of all rational numbers and * be the binary operation on G defined by $a * b = \frac{ab}{a} \forall a, b \in G$ then prove that (G, *) is an abelian group. Solve $4 * x = 3^{-1}$ $x^3 - y^2 + 4y - 7x^2 + 15x - 13 = 0$
 - Prove that $G = \{1, 5, 7, 11\}$ is a group under multiplication modulo 12.
 - Prove that a non-empty subset H of a group (G, *) is a subgroup of G, if and 7. a) Find the entire length of the asteroid $x^{23} + y^{23} = a^{23}$ only if

b) Find the envelope of $x\cos^3\theta + y\sin^3\theta = c$, where $H \ge d$, $B \forall H \ge d * a$ (i

c) Find the volume of the solid obtained by revolving the cardioid

OR

0.T.q $f = a (1 + cos \theta)$ about the initial line.

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- 3. a) Prove that every group of order 4 is abelian.
 - b) Prove that $G = \{2^n/n \in Z\}$ is a group under multiplication.
 - c) Prove that $H = \{1, 2, 4\}$ is a subgroup of the group $G = \{1, 2, 3, 4, 5, 6\}$ under multiplication modulo 7.

Answer any two full questions :

(2×15=30)

Solve 4 * x = 3-1

- 4. a) With usual notations, prove that $tan\phi = r \frac{d\theta}{dr}$ for the polar curve, $r = f(\theta)$.
 - b) Show that the curves $r = a (1 + cos\theta)$, $r = b(1 cos\theta)$ intersect orthogonally.
 - c) Show that the evaluate of the parabola $y^2 = 4ax$ is $27ay^2 = 4(x 2a)^3$.

d). Find the length of the polar subtangent for the curvision a sec20.

- 5. a) Find the angle of intersection of the curves $r = \sin\theta + \cos\theta$ and $r = 2 \sin\theta$.
 - b) Derive the formula for radius of curvature in parametric form.

c) Find the pedal equation of the curve $x^{2/3} + y^{2/3} = a^{2/3}$.

6. a) Find all the asymptotes of the curve

 $2x^3 - x^2y - 2xy^2 + y^3 - 4x^2 + 8xy - 4x + 1 = 0.$

- b) Find the surface area of the solid generated by revolving about the y-axis the curve $x = y^3$ from y = 0 to y = 2.
 - c) Find the position and nature of the double points of the curve

 $x^{3} - y^{2} + 4y - 7x^{2} + 15x - 13 = 0.$ (d) Prove that G = {1, 5, 7, 11} is a group under multiplication modulo 12.

7. a) Find the entire length of the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$.

- b) Find the envelope of $x\cos^3\theta + y\sin^3\theta = c$, where θ is the parameter.
- c) Find the volume of the solid obtained by revolving the cardioid
- $r = a (1 + \cos\theta)$ about the initial line.

 $(1 \times 15 = 15)$

PART – D S and Onwarde

Answer any one full question :

8. a) Solve :
$$x \frac{dy}{dx} + (1 - x) y = x^2 y^2$$
.

- b) Solve : $x = yP + P^2$.
- c) Verify for exactness and solve :

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$$(4x + 3y + 1) dx + (3x + 2y + 1) dy = 0.$$

OR

9. a) Solve :
$$x \frac{dy}{dx} + y \log y = xye^{x}$$
.

- b) Find the general and singular solution of $y = 3px + 6y^2p^2$. (Hint-put $y^3 = v$).
- c) Show that the family of curves $\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$ is self orthogonal, λ is a parameter.