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Register Number:

**10-04-2017**

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**B.Sc. MATHEMATICS - II SEMESTER**

**EXAMINATION - MARCH 2017**

**MT 215: Mathematics - II**

**Time:2 1/2 hrs** **Maximum marks: 70**

*This question paper has 2printed pages and 5 parts*

**I. ANSWER ANY FIVE QUESTIONS.** **(5X2=10)**

1. On the set of real numbers R, is defined by a b =  a, b R. Is  a binary operation on R ? Justify.
2. If.
3. Find the polar subtangent at the point for the curve.
4. For the cycloid x = a (t + sin t), y = a (1 – cos t) show that = 
5. Find the singular points on the curve x3 + x2 + y2– x–4y + 3 = 0
6. Find the area bounded by the x axis and the curve y = sin2x between x = 0 and x =
7. Solve 
8. Show that the equation is exact.

**II ANSWER ANY THREE QUESTIONS (3x 6 = 18)**

1. Prove that a group of order 3 is abelian.

MT-215-A-17

1. If Q+ is the set of all positive rational numbers and is a binary operation defined on Q+ by a b = a,b Q+,then prove that ( Q+, \*) is an infinite abelian group. Solve 4 \* x =5-1 in Q+.

1. Prove that a non empty subset H of a group (G, \*) is a subgroup of G iff a,bH,

a\*b-1H.

1. Prove that in a group G, (ab)-1 = b-1 a-1. Under what condition (ab)-1 = a-1b-1 a, bG

**III ANSWER ANY THREE QUESTIONS (3x 6 = 18)**

13. With usual notation prove that for the polar curve .

14. Find the angle of intersection of the curves and 

15. Find the radii of curvature for the curve,

 

16. Find all the asymptotes of the curve y3 –3x2y + xy2–3x3+2y2+2xy+4x+5y+6 = 0

17. Discuss the position and nature of the double points on the curve
 

**IV. ANSWER ANY ONE QUESTION (1 x 6 = 6)**

18. Find the Volume of the solid obtained by revolving the cardioid

 about the initial line.

19. Find the surface area of the hemisphere of radius a.

**V. ANSWER ANY THREE QUESTIONS (3x 6 = 18)**

20. Solve 

21. Solve 

22. Find the general and singular solution of 

23. Show that the family of parabolas is self orthogonal.

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