

**Avinashilingam Institute for Home Science and Higher Education for Women  
(Deemed to be University), Coimbatore-641 043  
Bachelor's Degree Examination- November 2018**

**I-Semester**

Class : I UG

Time: 3 hours

Major: Mathematics

Max. Marks: 100

**18BMAC01 – Analytical Geometry  
Part-A**

**10 x 1=10**

**Answer all the questions**

**Circle the correct answer**

1. The condition for two circles to cut one another orthogonally is
  - a.  $2g+2f = C+C_1$
  - b.  $2gg_1+2ff_1 = C+ C_1$
  - c.  $2g_1 + 2f_1 = C+C_1$
  - d.  $2gg_1 + 2ff_1 = C_1$
2. Limiting points of the coaxial system  $x^2+y^2+2\lambda x+c = 0$  are
  - a.  $(0, \pm C)$
  - b.  $(\pm C, 0)$
  - c.  $(\pm \sqrt{C}, 0)$
  - d.  $(0, \pm \sqrt{C})$
3. If a conic the semi-latus rectum is the \_\_\_\_\_ mean between the segments of a focal chord
  - a. Simple
  - b. arithmetic
  - c. harmonic
  - d. geometric
4. The condition that the line  $\frac{l}{r} = A\cos\theta + B\sin\theta$  may be a tangent to the conic  $\frac{l}{r} = 1 + e\cos\theta$ 
  - a.  $A^2 + B^2 = 1$
  - b.  $(A-e)^2+B^2 = 1$
  - c.  $\frac{l}{r} = 1 + e\cos\theta + \cos(\theta - \alpha)$
  - d.  $\frac{l}{r} = e\cos(\theta - \gamma) + \cos(\theta - \alpha)$
5. The equation of the sphere with centre at the origin and its radius a is \_\_\_\_\_.
  - a.  $x^2+y^2+z^2 = a^2$
  - b.  $x^2+y^2+z^2 = 0$
  - c.  $x^2+y^2+z^2+2ux+2vy+2wz+a = 0$
  - d.  $x^2+y^2+z^2+2wx+2vy+2wz+d = 0$
6. The intersection of a plane and a sphere is a \_\_\_\_\_.
  - a. Chord
  - b. Circle
  - c. line
  - d. tangent
7. Every general equation of second degree may not represent \_\_\_\_\_.
  - a. Cylinder
  - b. Cone
  - c. sphere
  - d. Plane
8. The section of the cone by any plane perpendicular to its axis is a \_\_\_\_\_.
  - a. Cylinder
  - b. Cone
  - c. sphere
  - d. Circle
9. \_\_\_\_\_ is a surface generated by a straight line which is always parallel to a fixed line.
  - a. Cone
  - b. Cylinder
  - c. plane
  - d. Sphere
10. The condition that the plane should cut the cone in perpendicular generators is  $\theta =$  \_\_\_\_\_.
  - a.  $30^\circ$
  - b.  $45^\circ$
  - c.  $90^\circ$
  - d.  $180^\circ$

**Part B**

**(5 X 6=30)**

**Answer all the questions**

11.a Find the circle which cut orthogonally each of the following circles :

$$x^2+y^2+2x+4y+1 = 0, x^2+y^2-4x+3=0, x^2+y^2+6y+5=0$$

(or)

11. b. Find the condition that the line  $y=mx+c$  should touch the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

- 12.a. Derive the equation of the circle in polar co-ordinates  
(or)
- 12.b. Describe the polar equation of a Conic
13. a. Find the equation of the sphere which has its centre at the point (6,-1,2) and touches the plane  $2x-y+2z-2 = 0$   
(or)
13. b. Show that the plane  $2x-y-2z = 16$  touches the sphere  $x^2+y^2+z^2-4x+2y+2z-3=0$  and find the point of contact
- 14.a. Show that the equation of a right circular cone whose vertex is 0, axis OZ and semi-vertical angle  $\alpha$  is  $x^2+y^2 = Z^2 \tan^2 \alpha$   
(or)
- 14.b. Find the general equation of a cone which touches the co-ordinate planes.
- 15.a. Derive the intersection of a line and a quadric.  
(or)
15. b. If OD is the diameter parallel to a secant APQ through A meeting the conicoid at P and Q  
Show that  $\frac{AP.AQ}{OD^2}$  is constant

**Part C**

**5 x 12=60**

**Answer all the questions**

- 16.a. Obtain the equation of a circle which passes through the point (1,2) bisects the Circumference of the circle  $x^2+y^2 = 9$  and cuts orthogonally the circle  $X^2+y^2-2x+8y-7 = 0$   
(or)
16. b. Find the equation to the circle whose diameter is the common chord of the two circles  $(x-a)^2+y^2 = a^2$  and  $x^2+(y-b)^2 = b^2$ . Find also the length of the common chord
- 17.a. Trace the conic  $\frac{l}{r} = 1 + e \cos \theta$   
(or)
17. b. Trace the curve  $\frac{l^2}{r} = 4 + \sqrt{3} \cos \theta + \sin \theta$
- 18.a. Find the shortest distance between the lines :  
 $\frac{x-3}{-1} = \frac{y-4}{2} = \frac{z+2}{1}$ ,  $\frac{x-1}{1} = \frac{y+7}{3} = \frac{z+2}{2}$   
(or)
18. b. Find the equation of the sphere which passes through the circle  $x^2+y^2+z^2-2x-4y = 0$ ,  $x+2y+3Z=8$  and touches the plane  $4x+3y=25$
- 19.a. Find the condition for the equation  $ax^2+by^2+cz^2+2gzx+2fxy = 0$  to represent the right circular cone. Obtain the equation of the axis and the vertical angle of the cone.  
(or)
19. b. Explain the intersection of a straight line and a quadratic cone
- 20.a. Find the equation of the cone through the coordinate axes and the lines in which the plane  $lx+my+nz = 0$  cuts the cone  $ax^2+by^2+cZ^2+2fyz+2gzx+2bxy = 0$ .  
(or)
- 20.b. Derive the angle between the lines in which a plane  $ux+vy+wz = 0$  cuts the cone.

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