

**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  $\frac{AP \cdot AQ}{OD^2}$  is constant

**Part C**  
**Answer all the questions**

**5 x 12 = 60**

- 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.  
\*\*\*\*\*

