

**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 : B. Sc. Special Education and Mathematics

Max. Marks: 100

18BSMC01 – ANALYTICAL GEOMETRY AND CLASSICAL ALGEBRA

Part-A

10 x 1=10

Choose the correct answer

1. The radical axis is _____ to the line of centres.
(a) perpendicular (b) parallel (c) tangent (d) normal
2. A system of circles in which every pair of circles has the same radical axis is called a _____ system.
(a) radical (b) coaxial (c) orthogonal (d) Limiting
3. A circle will cut a parabola in 4 points and the algebraic sum of the ordinates of the 4 points is _____
(a) 0 (b) 1 (c) constant (d) ∞
4. The line $y = mx, y = m_1x$ are conjugate diameters of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if $mm_1 =$ _____
(a) $\frac{b^2}{a^2}$ (b) $\frac{a^2}{b^2}$ (c) $-\frac{b^2}{a^2}$ (d) $-\frac{a^2}{b^2}$
5. Find the remainder when $2x^6 + 3x^5 - 15x^2 + 2x - 4$ is divided by $x + 5$.
(a) 20486 (b) 21486 (c) 22486 (d) 23486
6. An equation $f(x) = 0$ cannot have _____ positive roots than there are changes of sign in $f(x)$.
(a) One (b) Two (c) Zero (d) more
7. The value of the Euler's function, $\varphi(2) =$ _____
(a) 0 (b) 1 (c) 2 (d) 3
8. The integral part of a number $x = \sqrt{2}$ is _____
(a) 0 (b) 1 (c) 2 (d) 3
9. If two numbers are congruent with respect to the modulus m , each is called a _____ of the other to the modulus m .
(a) residue (b) integral (c) congruence (d) coprime
10. Every integer which is a perfect cube is of the form _____
(a) $17p$ (b) p (c) $7p$ (d) $9p$

Answer the following
Answer should not exceed 400 words or two pages

11. (a) Find the radical centre of the three circles
 $x^2+y^2-x+3y-3=0$, $x^2+y^2-2x+2y+2=0$ and
 $x^2+y^2+2x+3y-9=0$.
 (or)
- (b) Find the circles which cuts orthogonally each of the following circles:
 $x^2+y^2+2x+4y+1=0$
 $x^2+y^2-4x+3=0$
 $x^2+y^2+6y+5=0$
12. (a) Chords of a parabola are drawn through a fixed point. Show that the locus of the middle points is another parabola.
 (or)
- (b) If a pair of conjugate diameters meet the hyperbola and its conjugate in P and D, then prove that $CP^2 - CD^2 = a^2 - b^2$.
13. (a) Change the equation $2x^4 - 3x^3 + 3x^2 - x + 2 = 0$ into another the coefficient of whose highest term will be unity.
 (or)
- (b) Find the quotient and remainder when $3x^3 + 8x^2 + 8x + 12$ is divided by $x - 4$.
14. (a) Find the number and sum of all the divisors of 360.
 (or)
- (b) Find the number of integers less than n and prime to it when $n = 729$ and 720 .
15. (a) Find a number having the remainders 5, 4, 3, 2 when divided by 6, 5, 4, 3 respectively.
 (or)
- (b) If x, y, z be three consecutive integers, show that $(\sum x)^3 - 3x^3$ is divided by 108.

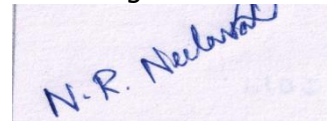
Part C

5 x 12=60

Answer the following
Answer should not exceed 800 words or four pages

16. (a) Show that the circles $x^2+y^2-6x+9y+13=0$ and $x^2+y^2-2x-16y=0$ touch each other and find the co-ordinates of the point of contact.
 (or)
- (b) 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
 $x^2+y^2-2x+8y-7=0$.
17. (a) Find the locus of the poles of all tangents to the parabola $y^2=4ax$ with respect to the parabola $y^2=4bx$.
 (or)
- (b) A tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose centre is C meets the circle $x^2+y^2=a^2+b^2$ at Q and Q' . Prove that CQ and CQ' are conjugate diameters of the ellipse.
18. (a) Find the roots of the equation $x^5+4x^4+3x^3+3x^2+4x+1=0$.
 (or)
- (b) Increase by 7 the roots of the equation $3x^4+7x^3-15x^2+x-2=0$.
19. (a) Find the highest power of 3 dividing $1000!$.
 (or)
- (b) Show that $n(n+1)(2n+1)$ is divisible by 6.
20. (a) Find the remainder obtained in dividing 2^{46} by 47.
 (or)
- (b) Show that $x^5 - x$ is divisible by 30.

Name and Signature of the Examiner

A small rectangular image showing a handwritten signature in blue ink on a light-colored background. The signature reads "N.R. Neelavathi".

N.R.NEELAVATHI