Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore-641 043

Bachelor's Degree Examination– November 2017

I Semester

Class : I UG **Time :3 hours**
Major : Special Education & Rehabilitation and Mathematics **Max.Marks: 100**

15BSMC01 Analytical Geometry and Classical Algebra

Part-A **10x1=10**
Choose the correct answer

1. Radical axis of two circles is _____ line.
   a. co-planer b.real c.imaginary d. parallel

2. A system of circles in which every pair of circles has the same radical axis is called a _____ system
   a. orthogonal b. radical c. coaxal d. bilinear

3. The condition for the line $y = mx + c$ will touch the parabola $y^2 = 4ax$ is _____.
   a.$a = \frac{c}{m}$ b. $c = \frac{a}{m}$ c.$m = ac$ d.$m = \frac{c}{a}$

4. The eccentricity of the ellipse $9x^2 + 25y^2 - 78x - 100y - 116 = 0$ is_____.
   a.$\frac{2}{5}$ b.$\frac{3}{5}$ c.$\frac{4}{5}$ d.$\frac{5}{4}$

5. The remainder when $x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$ is divided by $x - 2$ is_____.
   a. 1 b. -1 c. 8 d. -12

6. Transformed equation of $x^4 - 3x^3 + 4x^2 - 2x + 1 = 0$ by diminishing the roots by unity is _____ equation
   a. Reciprocal b. Quadratic polynomial c. Cubic d. Biquadratic

7. The number of integers less than 'n' and prime to it when n=729 is_____.
   a. 192 b. 483 c. 486 d. 720

8. The number of divisors of 840 is _____.
   a. 23 b. 31 c. 13 d. 32

9. The remainder when 2^{1000} is divisible by 17 is _____.
   a. 1 b. -1 c. 2 d. -2

10. If p is a prime and α is any number prime to p then _____ is divisible by p.
    $\alpha^{p-1} - 1$ b.$\alpha^p - 1$ c.α^{p-1} d.$\alpha^{p+1} - 1$

PartB **5X6=30**

Answer the following

Answer should not exceed 400 words or two pages

11.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)

11.b.Find the equation of the circles which passes through the points of intersection of $x^2+y^2-2x+1=0$ $x^2+y^2-5x-6y+4=0$, and which touch the line $2x-y+3=0$

12.a. Find the locus of the poles of chords of a parabola subtending at right angle at the vertex.

(or)

12.b.Prove that the acute angle between two conjugate diameters of an ellipse is a minimum when they are equal.

13.a. Determine completely the nature of the roots of the equation $x^5-6x^2-4x+5=0$ by Descartes'rule of signs.

(or)

13.b. Show that the equation $x^4-3x^2+4x^2-2x+1=0$ can be transformed into a reciprocal equation by diminishing the roots by unity.

14.a. Find the smallest number with 18 divisors.

(or)

14.b.Show that $n(n+1)(2n+1)$ is divisible by 6.

15.a. Show that $13^{2n+1}+9^{2n+1}$ is divisible by 22.

(or)

15.b. If x,y,z be three consecutive integers, show that $(\sum x)^3-3\sum x^3$ is divisible by 108.

Part C **5x12=60**

Answer the following

Answer should not exceed 800 words or four pages

16.a. Find the equation to the circle whose diameter is common chord of the circle whose diameter is 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.

(or)

16.b.Find the limiting points of the system of the circles coaxalwith $x^2+y^2-6x-6y+4=0$, $x^2+y^2-2x-4y+3=0$.

17.a. Find the equation of the pair of tangents to the parabola $y^2=4ax$ from the point (x_1,y_1) and also show that perpendicular tangents to a parabola intersect on the directrix.

(or)

17. b.Show that the parallelogram formed by the tangents at the extremities of conjugate diameters has its vertices lying on the asymptotes and is of constant area.

18.a. Solve the equation $6x^5-x^4-43x^3+43x^2+x-6=0$

(or)

18.b. Diminish the roots of $x^4-5x^3+7x^2-4x+5=0$ by 2.

19.a. Find the value of Euler function $\Phi(N)$.

(or)

19.b. Find the highest powers of 2,5,7,11,13 contained in $1000!$.

20.a. Find the remainder obtained in dividing 2^{46} by 47.

(or)

20.b. Show that if x and y are both prime to the prime number n,then $x^{n-1}-y^{n-1}$ is divisible by n and deduce that $x^{12}-y^{12}$is divisible by 1365.

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