Code No.: 41151 E Sub. Code: JMMA 12/ JMMC 12/SMMA 12

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2019.

First Semester

Mathematics / Mathematics with CA — Main CLASSICAL ALGEBRA

(For those who joined in July 2016 onwards)

Time: Three hours Maximum: 75 marks

SECTION A — $(10 \times 1 = 10 \text{ marks})$

Answer ALL questions.

Choose the correct answer:

- 1. If the equation $2x^3 3x^2 + 2x 3 = 0$ has one root 'i' then, its real root is
 - (a) $\frac{2}{3}$
 - (b) $-\frac{2}{3}$
 - (c) $\frac{3}{2}$
 - (d) 1

2.	The smallest degree of an equation with rational							
	coefficients	two	of	whose	roots	are	2 + 3i	and
	2-3i roots is							

(a) 2

(b) 4

(c) 6

(d) 3

3. The sum of the roots of the equation $x^4 - ax^3 + bx^2 - cx + d = 0 \text{ is}$

(a) $-\frac{b}{a}$

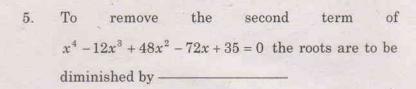
(b) $\frac{b}{a}$

(c) a

(d) - a

4. A reciprocal equation $a_0 x^n + a_1 x^{n-1} + + a_n = 0$ is said to be of second type is

- (a) $a_{n-r} = a_{r-1}$
- (b) $a_{n-r} = a_{r+1}$
- (c) $a_{n-r} = a_r$
- (d) $a_{n-r} = -a_r$



(a) 1

(b) 2

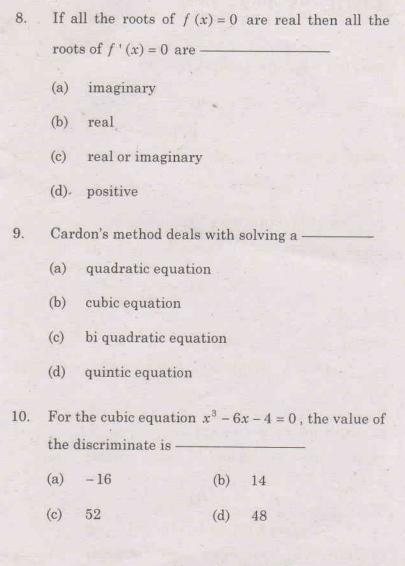
(c) 3

- (d) -1
- 6. If the roots of $x^3 8x^2 + 19x 12 = 0$ are 1, 3, 4 then the roots of $x^3 - 16x^2 + 76x - 96 = 0$ are
 - (a) 1, 3, 4

(b) -1, -3, -4

(c) 2, 6, 8

- (d) 1, 9, 16
- 7. The negative roots of f(x) = 0 are ———
 - (a) positive roots of f(-x) = 0
 - (b) positive roots of f(-x) = -1
 - (c) positive roots of f(+x) = 0
 - (d) negative roots of f(-x) = 0



SECTION B — $(5 \times 5 = 25 \text{ marks})$

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) If one root of the equation $2x^3 - 11x^2 + 38x - 39 = 0 \text{ is } 2 - 3i \text{. Solve the equation.}$

Or

- (b) Solve the equation $4x^3 24x^2 + 23x + 18 = 0$, given that the roots are in arithmetic progression.
- 12. (a) If $\alpha + \beta + \gamma = 6$, $\alpha^2 + \beta^2 + \gamma^2 = 14$ and $\alpha^3 + \beta^3 + \gamma^3 = 36$ prove that, $\alpha^4 + \beta^4 + \gamma^4 = 98$.

Or

(b) Show that $4(x^2 - x + 1)^3 = 27x^2(x - 1)^2$ is a standard reciprocal equation.

Page 5 Code No.: 41151 E

13. (a) Increase the roots of the equation $3x^4 + 7x^3 - 15x^2 + x - 2 = 0 \text{ by } 7.$

Or

- (b) Discuss the reality of the roots $x^4 + 4x^3 2x^2 12x + a = 0$ for all values of a.
- 14. (a) Find the multiple roots of $x^5 x^4 + 2x^3 2x^2 + x 1 = 0$ and hence solve.

Or

- (b) Obtain by Newton's method the root of the equation $x^3 3x + 1 = 0$ which lies between 1 and 2.
- 15. (a) Solve $x^4 10x^3 + 35x^2 50x + 24 = 0$ using Ferrari's method.

Or

(b) Solve $2x^3 + 3x^2 + 3x + 1 = 0$ by Cardan's method.

Page 6 Code No.: 41151 E

SECTION C — $(5 \times 8 = 40 \text{ marks})$

Answer ALL questions, choosing either (a) or (b). Each answer should not exceed 600 words.

16. (a) One root of the equation $2x^6 - 3x^5 + 5x^4 + 6x^3 - 27x + 81 = 0$ is $\sqrt{2} + i$. Find the remaining roots.

Or

- (b) Show that the roots of the equation $px^3 + qx^2 + rx + s = 0 \quad \text{are} \quad \text{in G.P.} \quad \text{iff}$ $r^3p = q^3s \; .$
- 17. (a) State and prove Newton's theorem.

Or

- (b) Solve: $6x^5 + 11x^4 33x^2 + 11x + 6 = 0$.
- 18. (a) State and prove Rolle's theorem.

Or

(b) Find the nature of the roots of $x^4 + 4x^3 - 20x^2 + 10 = 0$.

Page 7 Code No.: 41151 E

19. (a) Find the strum's functions for the polynomial $x^4 - 2x^3 - 3x^2 + 10x - 4$.

Or

- (b) Find the positive root of the equation $x^3 2x^2 3x 4 = 0$ correct to three places of decimals.
- 20. (a) Solve $x^3 3x^2 10x + 24 = 0$ using Cardan's method.

Or

(b) Solve $4x^4 + 8x^3 + 12x^2 + 4x + 5 = 0$ using Ferrari's method.