

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 9

Sub. Code : 

1	0	8	7	9
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Exam. Code : 

5	0	0	3
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Bachelor of Arts (FYUP) 3<sup>rd</sup> Semester

(2125)

MATHEMATICS

Paper : Theory of Equations

Time Allowed : Three Hours]

[Maximum Marks : 80

Note :— Attempt five questions in all including Question Number 1 which is compulsory and selecting one question from each Unit.

(Compulsory Question)

1. (a) Find  $2^6 - 4.2^4 + 7.2^3 - 10.2^2 - 2^1 - 14$  by Horner's synthetic division. 2
- (b) Show that the equation  $x^{20} - 20 = 0$  has exactly two real roots. 2
- (c) Find the value of K, given that roots of the equation  $3x^3 - 27x^2 + 22x + K = 0$  are in A.P. 3
- (d) Form an equation whose roots are the negative of the roots of equation  $x^4 - 3x^2 + 7x - 1 = 0$ . 3
- (e) Remove the second term from equation  $x^4 + 8x^3 + x - 5 = 0$ . 3
- (f) Compute the discriminant of the cubic equation  $x^3 + 6x + 3 = 0$ . 3

### UNIT—I

2. (a) Use Horner's method to express  $f(x+3)$  in powers of  $x$  where  $f(x) = x^5 - 6x^4 + 8x^3 + 7x^2 + x - 11$ . 8
- (b) Find the g.c.d. of two polynomials  
 $f(x) = x^3 + 6x^2 + 11x + 6$  and  $g(x) = x^2 + 7x + 10$ . 8
3. (a) Solve the equation  $6x^4 - 13x^3 - 35x^2 - x + 3 = 0$  which has a root  $2 - \sqrt{3}$ . 8
- (b) Show that  $x^3 - 3x^2 - 4 = 0$  has no repeated roots. 8

### UNIT—II

4. (a) The roots of the equation  $x^4 + 6x^3 - 16x^2 + 24x - 80 = 0$  are purely imaginary. Solve the equation completely. 8
- (b) Solve the equation  $x^4 - 8x^3 + 14x^2 + 8x - 15 = 0$ , the roots being in A.P. 8
5. (a) Solve the equation  $x^4 - 5x^3 + 10x^2 - 10x + 4 = 0$  where the product of two roots is equal to the product of the other two roots. 8
- (b) Use Newton's method of divisors to find the integral roots of the equation  $3x^4 - 23x^3 + 35x^2 + 31x - 30 = 0$ . 8

### UNIT—III

6. Find  $\lambda$  and solve the equation  $40x^4 + \lambda x^3 - 21x^2 - 2x + 1 = 0$  given that roots are in H.P. 16

7. (a) Transform the equation  $x^3 - 6x^2 + 11x - 6 = 0$  by transformation  $y = x - 2$  and hence find all the roots of the given equation. 8
- (b) Find the equation whose roots are the cubes of the roots of the equation  $x^4 - x^3 + 2x^2 + 3x + 1 = 0$ . 8

#### UNIT—IV

8. (a) Use Cardon's method to solve  $x^3 - 15x^2 - 33x + 847 = 0$ . 8
- (b) For the equation  $x^3 - 6x^2 - 6x - 14 = 0$ . Find  $G^2 + 4H^3$  and hence discuss the nature of its roots. 8
9. (a) Solve  $x^4 - 4x^3 + 9x^2 - 12x + 18 = 0$  by Descartes' method. 8
- (b) Apply Ferrari's method to solve the equation  $x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$ . 8