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DMM-3348

B. Sc. (Sem. IV) Examination

April / May - 2016

Mathematical Methods - II

(Elective Generic)

(Old Course)

Time : **2** Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. SC. (SEM. 4)**

Name of the Subject :

☛ **MATHEMATICAL METHODS - 2 (OLD)**

☛ Subject Code No. : **3 3 4 8** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Follow usual notations.

(4) Figures to the right indicate full marks of the question.

1 (a) Answer any **FIVE** as directed. **[05]**

(1) State the fundamental theorem of theory of equations

(2) If α, β, γ are the roots of equation $f(x) = 0$ then write the equation whose roots are $2\alpha, 2\beta, 2\gamma$.

(3) For any complete polynomial of n^{th} degree, if the number of change in signs is λ and number of continuation is μ then state the value of $\mu + \lambda$.

(4) State all the three cube roots of unity. Also state the real and imaginary parts of its complex roots.

(5) Show that $x^5 - 2x^2 + 7 = 0$ has at least two complex roots.

(6) Find the number of change in signs for the polynomial $x^7 + 2x^6 - 3x^5 - 4x^4 - 2x^3 + 5x^2 - 6x + 11$.

2 (a) If the equation $x^n + p_1x^{n-1} + p_2x^{n-2} + \cdots + p_n = 0$ has roots $\alpha_1, \alpha_2, \ldots, \alpha_n$; then prove that $\sum \alpha_i = -p_1$, $\sum_{i\neq j} \alpha_i\alpha_j = p_2$, $\sum_{i\neq j\neq k} \alpha_i\alpha_j\alpha_k = -p_3, \ldots, \alpha_1\alpha_2 \cdots \alpha_n = (-1)^n p_n$. [08]

OR

(a) If the polynomial $x^n + p_1x^{n-1} + p_2x^{n-2} + \cdots + p_n = 0$ has roots $\alpha_1, \alpha_2, \ldots, \alpha_n$ then derive the relation between these roots and coefficients of the polynomial.

(b) If α, β, γ are the roots of the equation $2x^3 + 3x^2 - x - 1 = 0$ then find the equation whose roots are $\alpha + 2,\ \beta + 2,\ \gamma + 2$. [07]

OR

(b) If α, β, γ are the roots of the equation $8x^3 - 4x^2 + 6x - 1 = 0$ then find the equation whose roots are $\alpha + \frac{1}{2}, \beta + \frac{1}{2}, \gamma + \frac{1}{2}$.

3 (a) State and prove the Descarte's rule of signs. [08]

OR

(a) Explain the method of eliminating the term x^{n-1} from the equation $f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \cdots + a_n = 0$.

(b) Convert the equation $x^4 + 8x^3 + x^2 - 10 = 0$ into an equation which do not contain the second term. [07]

OR

(b) Convert the equation $x^3 - 6x^2 + 4x - 7 = 0$ into an equation which do not contain the second term.

4 (a) If α, β, γ are the roots of the equation $ax^3 + 3bx^2 + 3cx + d = 0$ and if $H = ac - b^2, G = a^2d - 3abc + 2b^3$ then prove that $a^3(2\alpha - \beta - \gamma)(2\beta - \gamma - \alpha)(2\gamma - \alpha - \beta) = -27G$. [08]

OR

(a) Obtain real roots of the equation $x^3 - 3x + 1 = 0$.

(b) Solve $x^4 - 4x^3 + 2x^2 + 4x - 3 = 0$ by Ferrari's method. [07]

OR

(b) Solve the equation $x^3 + 9x - 6 = 0$ using Cardan's method.
