AC-3107

B. Sc. (Sem. - IV) Examination

April / May – 2015

Mathematical Methods - II

(Elective Generic) (New 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. - IV)**

Name of the Subject :
☛ **MATHEMATICAL METHODS - II (NEW)**

☛ Subject Code No. : **3 1 0 7** ☛ 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) 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 $\mu + \lambda$.

(2) State the fundamental theorem of theory of equations.

(3) If α, β, γ are the roots of equation $f(x) = 0$ then write the equation whose roots are $\frac{-1}{\alpha}, \frac{-1}{\beta}, \frac{-1}{\gamma}$.

(4) State the Descarte's rule of signs.

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

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

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) State the fundamental theorem of Theory of Equations. Hence show that any n^{th} degree polynomial equation has n roots. **[08]**

(b) If α, β, γ are the roots of the equation $x^3 + 5x^2 + 7x - 12 = 0$ then find the equation whose roots are $\alpha^3,\ \beta^3,\ \gamma^3$. **[07]**

OR

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

:3 (a) Show that the number of positive roots of the equation $f(x) = 0$ cannot be more than the number of change in sign of its terms. **[08]**

OR

(a) Explain the method of eliminating the term $x^{n-1}$from the equation $f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \cdots + a_n = 0$. **[08]**

(b) Convert the equation $x^3 - 6x^2 + 4x - 7 = 0$ into an equation which do not contain the second term. **[07]**

OR

(b) From the equation $72x^3 - 54x^2 + 45x - 7 = 0$, obtain an equation whose coefficient of the term having x^3 is 1 and other terms have minimum coefficients. **[07]**

4 (a) Obtain real roots of the equation $x^3 - 3x + 1 = 0$. **[08]**

OR

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

(b) Solve $x^4 + 12x - 5 = 0$ by Ferrari's method. **[07]**

OR

(b) Solve the equation $x^3 + 9x - 6 = 0$ using Cardan's method. **[07]**
