



Duration :- One and Half Hours.

Date :- 13-02-2006

Time:- 1.30 p.m. – 3.00 p.m.

Answer All Questions.

01. (a) Prove that $\frac{d}{dx} \left(2\sqrt{ax^2 + bx + c} \right) = \frac{2ax + b}{\sqrt{ax^2 + bx + c}}.$

Hence show that $\int \frac{2ax + b}{\sqrt{ax^2 + bx + c}} dx = (2\sqrt{ax^2 + bx + c}) + k.$

Hence evaluate $\int \frac{2x + 1}{\sqrt{x^2 + x - 1}} dx.$

02. (a) Evaluate,

(i) $\int_0^1 (x^2 - 1) \left(\sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 dx.$

(ii) $\int_0^{\pi/4} \sin 3x (1 + \cos 3x) dx.$

(iii) $\int_0^{3/4} 2x\sqrt{1+x^2} dx.$

03 (a) Prove by Induction $1 + 2 + 3 + 4 + \dots + n = \frac{n}{2}(n+1).$

(b) Hence find the sum $\sum_{r=1}^n r(r+1).$