Seat No. _____

GANPAT UNIVERSITY

B. Tech. Sem. –II (ALL) Exam. May/June – 2012

Sub : HS – 102 : Engineering Mathematics – II

Time : 3 hrs **Total marks : 70**

Instruction : (1) All questions are compulsory.
(2) Write answer of each section in separate answer books.
(3) Figures to the right indicate marks of questions.

Section – I

QUE 1 **(12)**

(A) Define : Beta & Gamma function . Prove That : $\beta(m,n) = 2\int_0^{\frac{\pi}{2}} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta$

(B) Define : Error function and prove that $\text{erf}(-x) = -\text{erf}(x)$

(C) Evaluate in terms of Elliptic integral : $\int_0^{\pi/2} \frac{dx}{\sqrt{1+\sin^2 x}}$

OR

QUE 1 **(12)**

(A) Evaluate in terms of Gamma function : $\int_0^1 \frac{x}{\sqrt{1-x^5}}\, dx$

(B) Prove that : (1) $\text{erf}(0) = 0$ (2) $\text{erf}(x) + \text{erf}_c(x) = 1$

(C) Evaluate in terms of Elliptic integral $\int_0^{\pi/2} \frac{dx}{\sqrt{(4-x^2)(9-x^2)}}$

QUE 2

(A) Using Reduction formula Evaluate : $\int_0^{\pi} (1+\cos\theta)^4 \, d\theta$ **(03)**

(B) Prove that : $\int_0^1 \frac{x^{2n}}{\sqrt{1-x^2}}\, dx = \frac{(2n)!}{2^{2n}\,(n!)^2} \cdot \frac{\pi}{2}$ **(04)**

(C) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{1}{\sqrt{1-x^2-y^2-z^2}}\, dx\, dy\, dz$. **(04)**

OR

QUE 2

(A) Using Reduction formula Evaluate : $\int_0^{\pi/8} \cos^3(4\theta)\, d\theta$ **(03)**

(B) If $I_n = \int_0^{\pi/4} \tan^n x \, dx$ then P.T. $I_{n-1} + I_{n+1} = \frac{1}{n}$. **(04)**

(C) Evaluate : $\int_0^1 \int_0^{1-x} \int_0^{(x+y)^2} x \, dx\, dy\, dz$. **(04)**