Prof. Dr. K. Singh.

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END TERM TEST

SUMMER SEMESTER - JULY 2016

B.Tech Ist Semester

COURSE CODE: 10B11MA111 　　　　　　　　　　　　MAX. MARKS: 50

COURSE NAME: Mathematics I

COURSE CREDITS: 04 　　　　　　　　　　　　　　　MAX. TIME: 2 Hrs

Note: *All questions are compulsory. Carrying of mobile phone and calculator during examinations will be treated as case of unfair means. Marks are indicated in square brackets against each question.*

Q1. Evaluate the surface integral $\iint_s \vec{F}.\hat{n}\, ds$, where $\vec{F} = (x^2 + y^2 + z^2)(\hat{i} + \hat{j} + \hat{k})$, s is the surface of the tetrahedron $x = 0, y = 0, z = 0, x + y + z = 2$ and $\hat{n}$ is the unit vector in the outward direction to the closed surface s using Gauss divergence theorem. [7]

Q2. Solve the differential equation $(D^2 - 4D + 3)y = e^x \cos x$ [7]

Q3. (a) Find the Laplace transform of $t^2 e^t \sin 4t$. [3.5]

(b) Find the inverse Laplace transform of $\frac{1}{9s^2 + 6s + 1}$ [3.5]

Q4 Show that $L^{-1}\left\{\frac{s}{(s^2+1)(s^2+4)}\right\} = \frac{1}{3}(\cos t - \cos 2t)$ using Convolution theorem. [7]

Q5. Solve using Laplace transform method.

$y'' + 4y' + 4y = 6e^{-t}, y(0) = -2, y'(0) = 8$ [7]

Q6. Solve the system of equations using elimination method. [7]

$$x - y + 2z = 3$$
$$x + 2y + 3z = 5$$
$$3x - 4y - 5z = -13$$

Q7. Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ [8]