B.TECH. SEM -IV INFO. TECH. 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT : ENGINEERING MAHEMATICS – III

Day : **Saturday** Time **10.00 AM TO 01.00 PM**
Date : **02/06/2018** **S-2018-2296** Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw diagrams **WHEREVER** necessary.

Q.1 Solve : **(10)**

$$\frac{dx}{dt}+5x-2y=t$$
$$\frac{dy}{dt}+2x+y=0$$

having been given that $x=y=0$ at $t=0$

OR

Solve : $\left(x^3D^3+x^2D^2-2\right)y=x+\frac{1}{x^2}$ **(10)**

Q.2 Using Cauchy Residue theorem, evaluate $\int_0^{2\pi}\frac{d\theta}{5-3\cos\theta}$ **(10)**

OR

Find the mapping of the straight line $y=x$ under the transformation **(10)**

$w=\frac{z-1}{z+1}$.

Q.3 a) Find $z\{k(k-1)4^k\}$ for $k\geq 0$. **(05)**

b) Find the Fourier sine transform of **(05)**

$$f(x)=\begin{cases} x & 0<x<1 \\ 3-x & 1<x<3 \\ 0 & x>3 \end{cases}$$

OR

Find the Fourier transform of $f(x)=\begin{cases}1-x^2 & |x|\leq 1\\ 0 & |x|>1\end{cases}$ **(10)**

and use it to evaluate $\int_0^{\infty}\left(\frac{x\cos x-\sin x}{x^3}\right)\cos\frac{x}{2}dx$

P.T.O.

Q.4 **a)** Find $L\left[t^2 e^t \sinh 3t\right]$ **(05)**

b) Find $L^{-1}\left[\log\frac{(s^2+4)}{s^2}\right]$ **(05)**

OR

a) Use Laplace transform to evaluate $\int_0^\infty e^{-2t}\frac{\sin^2 t}{t}dt$. **(05)**

b) Find $L^{-1}\left[\frac{1}{s(s+1)^3}\right]$. **(05)**

Q.5 **a)** What is the value of m if $\overline{F}=(x+2y)\bar{i}+(my+4z)\bar{j}+(6z+x)\bar{k}$ is solenoidal . **(05)**

b) Find $\nabla\bullet\left[r\nabla\frac{1}{r^6}\right]$. **(05)**

OR

Show that $\overline{H}=h(r)\bar{r}$ is irrotational and determine *h(r)* such that $\overline{H}$ is solenoidal. **(10)**

Q.6 Verify Stoke's theorem for $\overline{G}=x^2\bar{i}+xy\bar{j}$ for the surface of a square lamina bounded by $x=-2, x=2, y=-2, y=2$. **(10)**

OR

Verify Green's theorem for $\overline{h}=(x^2-y^2)\bar{i}+(4y-6xy)\bar{j}$ over $x=0, y=0, x+y=1$. **(10)**

* * *