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BICE-007

(BTCSVI / BTECVI / BTELVI) B.Tech. (Degree)

Term-End Examination

December, 2013

BICE-007 : MATHEMATICS-III

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions. All questions carry **equal** marks . All the questions are to be answered in english only.*

1. (a) Find a Fourier series to represent $x - x^2$ from $x = -\pi$ to $x = \pi$ **5**

(b) Express $f(x) = x$ as a half range Sine series in $0 < x < 2$. **5**

2. Find the Fourier transform of **10**

$$f(x) = \begin{cases} 1 - x^2 & |x| \le 1 \\ 0 & |x| > 1 \end{cases}$$

Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos\frac{x}{2}\, dx$

3. (a) Solve $p + 3q = 5z + \tan(y - 3x)$ **5**

(b) Using method of separation of variable solve. **5**

$$\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u, \text{ where } u(x, 0) = 6e^{-3x}$$

4. An insulated rod of length has its ends A and B maintained at 0°C and 100°C respectively until steady state. Conditions prevail if B is suddenly reduced to 0°C and maintained at 0°C. Find the temperature at a distance x from A at time t. **10**

5. (a) Find the z transform of n sin nθ. **5**
   (b) Find the inverse z transform of **5**

$$\frac{2z^2+3z}{(z+2)(z-4)}$$

6. Using z transform solve $y_{n+2}+6y_{n+1}+9y_n=2^n$ with $y_0=y_1=0$. **10**

7. Find the curves on which the functional $\int_0^1 \left\{\left(y^1\right)^2+12xy\right\} dx$ with $y(0)=0$ and $y(1)=1$ can be extremised. **10**

8. (a) Using Newton formula. Find the value of $\frac{1}{31}$ correct up to 2 decimal places. **5**
   (b) Find the cubic polynomial which takes the following values. **5**

x	0	1	2	3
f(x)	1	2	1	10

9. Solve the Gauss-seidal iteration method up to 3 iteration. **10**

$20x+y-2z=17$
$2x-3y+20z=25$
$3x+20y-z=-18$

10. Evaluate $\int_0^1 \frac{dx}{1+x}$ using Simpson's $\frac{1}{3}$ rule taking $h = 0.1$ **10**