Roll No. .....

2002

B. E. (3rd Semester) (ECE) Examination – December, 2011

MATHEMATICS-III

Paper : Math-201-E

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions, selecting at least one question from each Part.

PART – A

1. (a) Find the Fourier series of $f(x) = x \sin x$ in the interval $0 < x < 2\pi$.

(b) Find the Fourier sine and cosine series of :

$$f(x) = \begin{cases} x, & 0 < x < \pi/2 \\ \pi - x, & \pi/2 < x < \pi \end{cases}$$

2. (a) Using Fourier Integral representation show that :

$$\int_0^\infty \frac{w \sin wx}{1+w^2} dw = \frac{\pi}{2} e^{-x} (x > 0)$$

(b) Find the Fourier transformation of e^{-x^2}.

PART – B

3. (a) Prove that :

(i) $\left[\sin(\alpha-\theta)+e^{-i\alpha}\sin\theta\right]^n = \sin^{n-1}\alpha\left[\sin(\alpha-n\theta)+e^{-i\alpha}\sin n\theta\right]$

(ii) $\tan\left[i\log\left(\frac{a-ib}{a+ib}\right)\right]=\frac{2ab}{a^2-b^2}$.

(b) Determine the **analytic** function where real part is $y+e^x\cos y$.

4. (a) Use Cauchy's **Integral** formulae, evaluate :

(i) $\oint_c \frac{z^2+1}{z(2z+1)}dz$, where c is $|z|=1$,

(ii) $\oint_c \frac{z}{z^2-3z+2}dz$, where c is $|z-2|=\frac{1}{2}$

(b) Find the Laurant's expansion of :

$f(z)=\frac{7z-2}{(z+1)z(z-2)}$ in the region $1<|z+1|<3$.

5. (a) Evaluate $\oint_c \frac{z-3}{z^2+2z+5)}dz$ where c is the circle

(i) $|z|=1$

(ii) $|z+1+i|=2$

(b) Evaluate $\int_0^{\infty} \frac{\sin mx}{x} dx$, where m > 0 by using calculus of residuces.

PART – C

6. (a) A box contains 2 white and 4 black balls. Another box B contains 5 white and 7 black balls. A ball is transferred from the box A to the box B. Then a ball is drawn from the box B. Find the probability that it is white.

(b) A die is tassed thrice. A success is 'getting' 1 or 6' on a toss. Find the mean and varience of successes.

7. (a) Fit a Possion distribution to the following :

x :	0	1	2	3	4
f :	46	38	22	9	1

(b) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.

8. (a) Using Graphical method, solve the following L.P. problem :

Minimize $Z = 20x_1 + 30x_2$,

Subject to = $x_1 + 2x_2 \leq 40$,

$3x_1 + x_2 \geq 30$,

$4x_1 + 3x_2 \geq 60$, $x_1, x_2 \geq 0$

(b) Using simplex method :

Maximize $Z = 10x_1 + x_2 + 2x_3$

Subject to $x_1 + x_2 - 2x_3 \leq 10,$

$4x_1 + x_2 + x_3 \leq 20,$

$x_1, x_2, x_3 \geq 0$
