2011

M.Sc.

1st Semester Examination

ELECTRONICS

PAPER—ELC-101

Full Marks : 50

Time : 2 hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Mathematical Methods and Numerical Analysis)

Answer *Q. No. 1* and any *three* questions from the rest.

1. Answer all questions : 2×5

a) Find out the Fourier and Laplace transforms of $\delta = (X - a)$.

b) Write a short note on 'for' loop in C.

(Turn Over)

c) Check whether $f(Z) = Z^2$ and Z^* are analytic functi
of Z from the concept of Cauchy-Riemann conditi

d) What will be the output of the print f statement i
with following formats :

(i) "% .0f\n", 3.0/4.0 ;

(ii) "% .1f\n", 3.0/4.0 ;

(iii) "% .2f\n", 3.0/4.0.

e) Write Bessel's equation of order n. What do you me
by Bessel's functions ?

2. a) Show that Laplace transform of convolution of
function L[f(t)*g(t)] = f(s) g(s). Also f(t)*g(t) =g(t)*f

b) Using the residue theorem, evaluate,

$$I = \int_0^{2\pi} \frac{d\theta}{5 + 4\cos\theta}.$$ (4+1)

3. a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using trapezoidal rule, correct
four decimal places dividing the interval (0, 6) i
six parts each of width h = 1.

b) Explain 'do-while' and 'while' statements. Comp
them.

c) Write a program to find the sum and average of n numbers. 5+2+3

4. a) Show that Fourier transform of a Gaussian is Gaussian.

b) Obtain the solution of the second order ordinary differential equation for damped oscillator given as follows :

$$m X''(t) + b X'(t) + k X(t) = 0$$

by the method of Laplace transform with the initial conditions $X(0) = X_0$ and $X'(0) = 0$ and symbols having usual meanings. 4+6

5. a) Describe Gauss-Jocobi's method to solve a system of linear equations.

b) Explain Euler method to solve the differential equation of the form

$$\frac{dy}{dx} = f(x, y), \; y(x_0) = y_0.$$ 5+5

6. a) Establish the generating function for Bessel's function $J_n(Z)$. Use it to prove that

$$Z J_n{}'(Z) = Z J_{n-1}(Z) - n J_n(Z).$$ 6

b) If a real-valued function f(t) of real variabl sectionally continuous in any finite interval of t is of exponential order ν at $t \to \infty$, when $t \geq 0$, t

prove that the integral $\int_0^\infty e^{-pt} f(t) dt$ converges in

domain Real $(p) > \nu$.

Internal Assessment — 10
