2008

ELECTRONICS

[1st Semester]

PAPER —EL - 1101

Full Marks : 50

Time : 2 hours

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

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

[University written Examination : 40 Marks
& Internal Assessment : 10 Marks]

1. Answer *all* questions :　　　　　　　　　　　2 x 5

   (*a*) Find Laplace transform of $\delta(t)$.

(b) Find the Fourier cosine transform of

$$f(x) = \begin{cases} \cos x \; ; & 0 < x < a \\ 0 \; ; & x > a \end{cases}$$

(c) Is the function $f(z) = |z|$ analytic near origin ?

(d) What are absolute error, relative error and percentage error ?

(e) What is the difference between while and do-while loop ?

2. (a) Find the Laplace transform of

(i) $e^{-2t} (3\cos 6t - 5\sin 6t)$

(ii) $(\sin t - \cos t)^2$.

(b) Find Fourier sine transform of

$$f(x) = \frac{e^{-ax}}{x}, \; a > 0. \qquad (3+3)+4$$

3. (a) Derive the iterative formula for Regula-Falsi method.

(b) Derive Newton's divided difference interpolation formula. $5+5$

4. Compute $y(0.3)$, from the equation

$$\frac{dy}{dx} = x - y, \quad y(0) = 1, \quad \text{taking} \quad h = 0.1, \quad \text{by}$$

fourth order Runge–Kutta method, correct to five decimal places. 10

5. (a) Write a program in C to evaluate ten value of $\sin x$ with the help of sine series, taking accuracy 0.000001.

(b) What do you mean by structure and pointer in C ? Explain with examples. Write a program segment to merge two strings in C. $5+5$

6. (a) If $f(z)$ is analytic, show that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4 |f'(z)|^2,$$

$$z = x + iy.$$

(b) Show that, under suitable conditions to be stated by you,

$$f'(a) = \frac{1}{2\pi i} \int_C \frac{f(z)\, dz}{(z-a)^2}$$

where C is a closed contour surrounding the point $z = a$. 5 + 5