

Roll No

BE-3001 (CE/TX) (CBGS)**B.E., IV Semester**

Examination, May 2018

Choice Based Grading System (CBGS)**Mathematics - III****Time : Three Hours****Maximum Marks : 70**

- Note:** i) Attempt any five questions out of eight.
 ii) All questions carry equal marks.

1. a) Obtain Fourier series of the function $f(x) = x$ in the interval $(-\pi, \pi)$.
 b) Obtain half range sine series for e^x in the interval $0 < x < l$.

2. a) Find the Fourier transform of $f(x)$ defined by

$$f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$$

- b) Find Fourier sine transform of $\frac{e^{-ax}}{x}$

3. a) Find Laplace transform of the following functions:

i) $6\sin 2t - 5\cos 2t$ ii) $\frac{e^{at} - 1}{a}$

- b) Find inverse Laplace transform of the following functions:

i) $\frac{1}{s^2 - 6s + 10}$ ii) $\frac{3s - 2}{s^2 - 4s + 20}$

4. a) Use convolution theorem to find

$$L^{-1} \left\{ \frac{1}{(p+1)(p-2)} \right\}$$

- b) Find Laplace transform of the followings:

i) $L\{e^t \sin^2 t\}$ ii) $L\{t^2 \sin at\}$

5. a) Show that the function $e^x (\cos y + i \sin y)$ is an analytic function. Find its derivative.

- b) Show that the function $u(x, y) = x^2 - y^2 + 2y$ is harmonic and find its conjugate.

6. a) Evaluate $\int_c \frac{e^z}{(z-1)(z-4)} dz$ where c is the circle $|z| = 2$

by using Cauchy's integral formula.

- b) Find poles and residues of the function

$$\frac{z^2}{(z-1)(z-2)(z-3)}$$

7. a) Find the root of the equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position. (upto 3 iterations only).

- b) Apply Newton-Raphs on method to solve $3x - \cos x - y = 0$. (upto 3 iterations only).

8. a) Using bisection method, find the root of the equation $x^3 + x - 1 = 0$ near $x = 1$. (upto three iterations only).

- b) Find a Fourier series to represent $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$.
