

Roll No

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

Examination, November 2018

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

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

1. a) Find the Fourier series to represent the function
 $f(x) = |\sin x|, -\pi < x < \pi.$
 b) Expand $f(x) = \sqrt{1 - \cos x}, 0 < x < 2\pi$ in a Fourier Series. <https://www.rgpvonline.com>
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 $f(x) = \begin{cases} \sin x, & 0 < x < a \\ 0, & x > a \end{cases}$
3. a) Find $L\{F(t)\}$, if $F(t) = \begin{cases} (t-1)^2, & t > 1 \\ 0, & 0 < t < 1 \end{cases}$
 b) By convolution theorem evaluate $L^{-1}\left\{\frac{1}{(s^2+9)(s+3)}\right\}.$

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4. a) Use Laplace transform method to solve

$$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t \text{ with } x = 2, \frac{dx}{dt} = -1 \text{ at } t = 0.$$

$$\text{b) Evaluate } L^{-1}\left\{\frac{5s^2 - 15s - 11}{(s+1)(s-2)^3}\right\}$$

5. a) Determine whether $\frac{1}{z}$ is analytic or not?

- b) Evaluate <https://www.rgpvonline.com>

$$\int_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz \text{ where } C \text{ is the circle } |z| = 3.$$

6. a) Find the poles, order of the poles and residue at it for the function $\frac{1}{(z^4+1)}$

- b) Find a bilinear transformation which maps the points $i, -i, 1$ of the z -plane into $0, 1, \infty$ of the w -plane respectively.

7. a) Find the root of the equation $xe^x = \cos x$ using the secant method correct to four decimal places.
 b) Find a real root of the equation $x \log_{10} x = 1.2$ by Regula-falsi method correct to three decimal places.

8. a) Find the real root of the equation $x^2 + 4 \sin x = 0$ correct to four places of decimal by using Newton-Raphson Method. <https://www.rgpvonline.com>
 b) Find all roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ by Graeffe's Method, squaring thrice.
