

Total No. of Questions : 8]

[Total No. of Printed Pages : 2

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## BE-3001(CE)-CBGS

B.E., IV Semester

Examination, December 2020

### 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.

2. a) Find Fourier sine transform of the function

$$2e^{-5x} + 5e^{-2x}$$

b) Find the Fourier transform of  $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$

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  $L^{-1} \left\{ \frac{1}{(s^2 + 9)(s + 3)} \right\}$

BE-3001(CE)-CBGS

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[2]

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) Use Cauchy-Riemann equation to find  $\psi$  when  
 $u = 3x^2y - y^3$ .

- b) Evaluate the integral  $\int_0^{1+i} z^2 dz$

6. a) Use Cauchy's integral formula, evaluate the integral

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

- b) Show that  $\int_0^\pi \frac{d\theta}{5+3\sin \theta} = \frac{\pi}{2}$ .

7. a) Using bisection method; find a real root of the equation  
 $x^4 - x - 10 = 0$ .

- b) Apply Newton's method to evaluate  $\sqrt{12}$  approximately.

8. a) Apply Newton-Raphson method to solve  $3x = \cos x + 1$ .

- b) Find the quadratic factor  $x^3 - 3.7x^2 + 6.25x - 4.069$ ,  
after two iteration, given  $p_0 = -2.5, q_0 = 0$ , by using  
Bairstow's method.

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