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Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

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MA-220 (CE/TX)

B.E. IV Semester

Examination, June 2017

Choice Based Credit System (CBCS)

Mathematics - III

Time : Three Hours

Maximum Marks : 60

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

1. a) Find the Fourier series expansion of the function $f(x) = |x|$ for $-\pi \le x \le \pi$ Hence deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots$$

b) Develop $\sin\left(\frac{\pi x}{l}\right)$ in a half range cosine series in the range $0 < x < l$

2. a) Find the Fourier transform of e^{-ax^2}, where $a > 0$
b) Find the Fourier sine transform of $f(x) = e^{-3x} + e^{-4x}$

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3. a) Solve $\frac{d^2y}{dx^2} - y = -f(x)$ $\lim_{|x|\to\infty} y(x) = 0$

b) Solve the following integral equation to obtain $f(x)$

$$\int_0^\infty f(x)\sin px\,dx = e^{-ap}$$

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4. a) State and prove change of scale property of Laplace transform.

b) Evaluate $L^{-1}\left\{\frac{p^2}{p^4 + 4a^4}\right\}$ www.rgpvonline.com

5. a) Using convolution theorem, evaluate

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

b) Solve $(D+1)^2 y = 3te^{-t}, t > 0$ with $y = 4$, $Dy = 2$ where $t = 0$

6. a) Show that the function $u = x^3 - 3xy^2$ is harmonic and find the corresponding analytic function.
b) Using Cauchy's integral formula evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}dz$ if c is the circle $|z| = 3$

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7. Evaluate $\int_0^\pi \frac{d\theta}{(a+\cos\theta)^2} = \frac{\pi a}{(a^2-1)^{\frac{3}{2}}} (a > 1)$

8. a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position correct to three decimal places.
b) Find a real root of the equation $x^3 - 2x - 5 = 0$ by using secant method correct to three decimal places.

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