B.E. II SEM (MAIN- EXAMINATION) MAY – 2021

MATHEMATICS –II

(CE,CSE,EE,ME & ECE)

(NEW COURSE)

Time: Three Hours | Maximum Marks :60

Note : Attempt all questions of section-A, Two questions from section-B and Two questions from section-C

SECTION – A 1*10=10

1. $y = x$ is a part of complementary function of the equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if :

   (a) $1+P+Q = 0$ b) $1-P-Q = 0$ (c) $2+2Px+Qx^2 = 0$ (d) none of these

2. The solution of $(D^2+2D+2)y = 0$, $y(0)=0$, $y'(0)=1$ is has :

   (a) $e^{x}\sin x$ (b) $e^{-x}\cos x$ (c) $e^{-x}\sin x$ (d)none of these

3. In homogeneous equation the degree of each term is

   (a)The same (b) Three (c)Different (d)none of these

4. $J_{-\frac{1}{2}}(x) =$ ....

   (a) $\sqrt{\frac{2}{\pi x}}\sin x$ (b) $\sqrt{\frac{2}{\pi}}\sin x$ (c) $\sqrt{\frac{2}{\pi x}}\cos x$ (d)none of these

5. $L(e^{4t}\sin t) =$ ....

6. The differential equation $\frac{\partial^2 z}{\partial x^2} = \frac{\partial^2 z}{\partial y^2}$ is classified as :

   (a)Hyperbolic (b) Elliptic (c)Parabolic (d)none of these

7. The P.I. of $\frac{1}{f(D)} e^{2x}\varphi(x) = e^{2x}\frac{1}{f(D+2)}\varphi(x)$ (True/False)

8. $L^{-1}\{\frac{e^{-2s}}{s}\} =$ ....

9. $x = 0$ is an ordinary point of $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + 4y = 0$ (True/False)

10. If $f(x) = x^2$ is expanded in a Fourier series in $(-\pi, \pi)$ then $a_n = 0$ (True/False)

SECTION – B 2*10=20

1. Solve the differential equation $(D^2+2D+1)y = x \sin x$
2. Using Convolution Theorem find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$, $a \neq b$
3. Solve $4\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = e^{x+2y}$
4. Prove that :

$$X J_n' = nJ_n - x J_{n+1}, \text{ where } J_n \text{ is Bessel function}$$

SECTION – C 2*15=30

1. Solve $\frac{d^2y}{dx^2} + n^2 y = \sec x$, by the method of variation of parameter.
2. Find the series solution of $x^2 \frac{d^2y}{dx^2} + 5x \frac{dy}{dx} + x^2 y = 0$ by Frobenius method.
3. Obtain the Fourier Series of the function $f(x) = \begin{cases} x, & -\pi<x<0 \\ -x, & 0<x<\pi \end{cases}$
4. By using method of separation of variable solve :

$$\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u, \quad u(x,0) = 6\, e^{-3x}$$