



PARUL UNIVERSITY

Faculty Of Engineering & Technology

Department of Applied Sciences & Humanities

1st year B.Tech Programme (All branches)

Mathematics-II (Subject Code :303191151)

ASSIGNMENT-II

Do as direct

1. What type of roots we can get, if $a^2 - 4ab = 0$?
2. Write general solution for $\frac{d^2y}{dx^2} + k^2y = 0$.
3. Write y_p for $x + \sin 4x$.
4. Solve Wronskian for $y'' + y = x \sin x$.
5. Write L.C.R equation if no extra charge is applied.
6. State convolution theorem.
7. Evaluate (i) $L^{-1} \left\{ \frac{s+1}{(s+1)^2+4} \right\} = \underline{\hspace{2cm}}$. (ii) $L^{-1} \left\{ \frac{3}{s^5} \right\} = \underline{\hspace{2cm}}$.
8. If $L\{f(t)\} = F(s)$ then $L\left\{\int_0^t f(u) du\right\} = \underline{\hspace{2cm}}$.
9. If $L\{f(t)\} = F(s)$ then $L\{(t-2)u(t-2)\} = \underline{\hspace{2cm}}$.
10. Evaluate $\int_0^1 \int_0^1 x^2 y^3 dy dx$.

Solve following (3-marks).

1. $y'' - 6y' + 7y = e^{2x}$.
2. $(D^2 + 25)y = \cos 5x$.
3. $y'' + 4y = 4x^2$.
4. $\frac{d^2y}{dx^2} + a^2y = \operatorname{cosec} ax$.
5. $y'' - 2y' + y = 3x^2$
6. Evaluate (i) $L^{-1} \left\{ \ln \frac{s+2}{s+3} \right\}$ (ii) $L^{-1} \left\{ \frac{s+5}{s^2+10s+29} \right\}$
7. Using convolution theorem, determine $L^{-1} \left\{ \frac{3}{s(s^2+9)} \right\}$.
8. Find the Laplace transform of
 - (i) $f(t) = te^{2t} \sin^2 3t$
 - (ii) $f(t) = \frac{e^t \sin \pi t}{t}$
 - (iii) $f(t) = \int_0^t t \sin^2 3t dt$

Solve following (4-marks).

1. $y'' + 2y' + 2y = 0$ for $y(0) = 1, y\left(\frac{\pi}{2}\right) = 0$.
2. Solve $y''' + 6y'' + 3y' - 10y = x$. Using undetermined coefficient method.
3. Evaluate $L^{-1} \left\{ \frac{3s^2+2}{(s+1)(s+2)(s+3)} \right\}$ (ii) $L^{-1} \left\{ \frac{3s+7}{(s^2+2s+5)} \right\}$

4. Evaluate $\iint_R xy dA$, where R is the region bounded x-axis, the ordinates $x=2a$ and the curve $x^2=4ay$.
5. Evaluate $L^{-1} \left\{ \frac{1+e^{-\frac{\pi}{2}s}}{(s^2+4)} \right\}$.

Solve following (5-marks).

1. Solve Cauchy -Euler equation $x^2y'' - 3xy' + 4y = 2x^2$.
2. $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 2y = 3 \log x$.
3. Change the order of integration in the following integration $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$
4. By using the method of Laplace transform, solve the initial value problem $y'' + 2y' + y = e^{-t}; y(0) = -1 \text{ and } y'(0) = 1$.
5. In an LCR circuit with equation $L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{C} = E(t)$, $R = 10 \text{ ohms}$
 $L = 1 \text{ henry}$, and $C = \frac{1}{1900} \text{ farad}$, Applied voltage $E(t) = 150 \text{ volts}$ and then find charge on capacitor at time t .