

Individual assignment

NB Perform this workout, execute a scan, and then approach the learning platform so that the weight does not above 250 mbs

- 1) A) The sum of n^{th} terms of certain series is $3n^2 + 10n$ for all value of n find the n^{th} terms and show that the series is an arithmetical progression.

B) how many terms of arithmetical progression $2 + 3\frac{1}{4} + 4\frac{1}{2} + \dots$ are needed to make the sum of 204.

- 2) If the impedance of a circuit is given as

$Z = 5 + j12 \Omega$ Calculate the

- a. Resistance
- b. Capacitance or Inductance,
- c. Phase angle,
- d. Magnitude

- 3) A) Determine the modulus and argument of

$$Z = \frac{1-i}{1+i} e^{\frac{2i\pi}{3}}$$

B) Given that $Z = 3 + 4i$ and $W = 12 + 5i$, write down the moduli and arguments of

- a) $Z.W$ b) $\frac{1}{Z}$ c) $\overline{ZW}$

- 4) Solve the following linear first-order differential equation: $\frac{dy}{dx} + 2y = 4e^{-x}$

- a) Find the integrating factor.
- b) Hence, determine the general solution of the differential equation
- c) If the initial condition is given as: $y(0) = 3$ find the particular solution.

5) Solve the following inhomogeneous second-order differential equation:

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{2x}$$

(a) Find the **complementary (homogeneous) solution** of the differential equation.

(b) Determine a **particular solution** using an appropriate method.

(c) Hence, write the **general solution** of the differential equation.

(d) If the initial conditions are given as:

$$y(0) = 1, y'(0) = 0$$

6) Use the **Laplace transform method** to solve the following differential equation:

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = e^{-t}$$

subject to the initial conditions: $y(0) = 0, y'(0) = 1$