

Question Bank (I scheme)

Name of subject: Applied Mathematics
Subject code: 22206/22224/22210/22201
Course : CH/CM/CE/EJ/IF/EE/ME
Semester: II

Unit Test : II

UNIT-3 (CO3)

(APPLICATION OF INTEGRATION)

2 marks-

- 1) Find the area bounded by the curve $y = 3x - 2$ from $x = 1$ to $x = 3$.
- 2) Find the area bounded by the parabola $y = x^2 - 2x$ with x- axis.
- 3) Find the area bounded under the curve $y = x^3 - 5x^2 + 4x$ from $x = 0$ to $x = 3$.
- 4) Find the volume of solid formed by revolving a line $y = x$ about x axis from $x = 0$ to 4.

4 marks-

- 1) Find the area of the circle $x^2 + y^2 = 25$ using integration.
- 2) Find the area of the ellipse $9x^2 + 4y^2 = 36$ using integration.
- 3) Find the area bounded by the parabola $y^2 = 4x$ and the line $2x - y = 4$.
- 4) Find the area of the circle $y^2 - 2x = 0$ and $y^2 + 4x - 12 = 0$.
- 5) Find the area between the curves $y = \sin x$ and $y = \cos x$ for $[0, 90^\circ]$.
- 6) Find the volume of sphere formed by revolving a semicircle $x^2 + y^2 = 25$ about x axis.
- 7) Find the volume of solid formed by revolving $y = r$ about x axis bounded by $x = h$ and y axis.

UNIT-4 (CO4)

(DIFFERENTIAL EQUATION)

2 marks:

- 1) Find the order and degree of
 - i) $\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^3}$
 - ii) $x^2\left(\frac{d^2y}{dx^2}\right)^2 + y\left(\frac{dy}{dx}\right)^3 + y^2 = 0$
- 2) Form a differential equation by eliminating constants from
 - i) $xy = a^2$
 - ii) $y^2 = 4ax$.
- 3) Solve $\sec^2x \cdot \tan y \, dx + \sec^2y \cdot \tan x \, dy = 0$.
- 4) Solve $\frac{dy}{dx} = e^{3x-2y} + x^2 \cdot e^{-2y}$

4 marks:

- 1) Solve $xy \log y dx + (1 + x^2)dy = 0$
- 2) Solve $\frac{dy}{dx} = (4x + y + 1)^2$
- 3) Solve $x \log x \frac{dy}{dx} + y = 2 \log x$
- 4) Solve $\frac{dy}{dx} + y \tan x = \cos^2 x$
- 5) Solve $x \frac{dy}{dx} + y = \log x$

(APPLICATION OF DIFFERENTIAL EQUATION)

2 marks:

- 1) Find the equation of curve passing through (2, 3) having slope $2x - 4$.
- 2) The velocity of a particle is given by $V = t^2 - 6t + 7$. Find distance covered in 3 seconds.

4 marks:

- 1) If the body obeys the law of motion $v \frac{dv}{dx} = -cv - bv^2$, find the velocity of particle on terms of x if it starts from rest.
- 2) The acceleration of a particle is given by $\frac{d^2x}{dt^2} = 3t^2 - 6t + 8$ find the distance covered in 2 sec. Given that $v = 0, x = 0$ at $t = 0$.

UNIT-5 (CO5)

(For Mechanical & Chemical Group)

(PROBABILITY DISTRIBUTION)

2 marks:

- 1) An unbiased coin is tossed 5 times, find the probability of getting at least 4 heads.
- 2) In poisson distribution, if $P(3) = P(4)$, find m.
- 3) Fit a Poisson distribution to set of following observations

x_i	0	1	2	3	4
f_i	122	60	15	2	1

4 marks:

- 1) If 30% of the bulbs are defective, find the probability that out of 4 bulbs Selected a) one is defective b) at the most two are defective.

- 2) Using Poisson's distribution, find the probability that the ace of spade will be drawn from a pack of cards at least once in 104 consecutive trials.
- 3) Assuming that 2 in 10 industrial accidents are due to fatigue, find the probability that exactly 2 out of 8 accidents will be due to fatigue.
- 4) A multiple choice test contains 20 questions. Each question has five choices for correct answer. What is the probability of making an 80% with random guessing?
- 5) 95% of students at college are between 1.1 m and 1.7m tall. Find mean and S. D., assuming normal distribution.

(For Computer Group)

(NUMERICAL METHODS)

2 marks:

- 1) Find the approximate root of the equation $x^3 - 9x + 1 = 0$ lies between 2 and 3 using bisection method (one iteration)
- 2) Using Bisection method find the approximate value of $\sqrt{10}$ perform one iteration
- 3) By using method of False Position find root of equation $x^2 + x - 1 = 0$ in the interval (0,1) (perform one iteration)
- 4) Solve following equations for x and y using Gauss-Elimination Method

$$x + y + z = 4; \quad 2x + y + z = 5; \quad 3x + 2y + z = 7$$
- 5) Solve following equations for y and z using Gauss-Elimination Method

$$x + y + z = 6; \quad 3x - y + 3z = 10; \quad 5x + 5y - 4z = 3$$
- 6) Show that root of the equation $x \cdot \log x = 1.2$ lies between (1,2)
- 7) Show that root of the equation $3x - \cos x - 1 = 0$ lies between (0,1)

4 marks:

- 8) Solve using Gauss-Elimination Method:

$$2x - 3y + 4z = 7; \quad 5x - 2y + 2z = 7; \quad 6x - 3y + 10z = 23$$
- 9) Solve using Jacobi's Method:

$$10x + y + 2z = 13; \quad 3x + 10y + z = 14; \quad 2x + 3y + 10z = 15$$
- 10) Solve using Jacobi's Method:

$$5x - y + z = 10; \quad 2x + 4y = 12; \quad x + y + 5z = -1$$
- 11) Solve using Gauss-Seidal Method:

$$10x + y + z = 12; \quad x + 10y + z = 12; \quad x + y + 10z = 12$$
- 12) Solve using Gauss-Seidal Method:

$$20x + y - 2z = 17; \quad 3x + 20y - z = -18; \quad 2x - 3y + 20z = 25$$
- 13) Find approximate root of the equation $x^3 - 2x - 5 = 0$ using Bisection method in the interval (2, 3) carry out three iterations.
- 14) Find approximate root of the equation $x^3 + 2x^2 - 8 = 0$ using Regula Falsi

method carry out three iterations.

- 15) Evaluate $\sqrt[3]{7}$ using Newton Raphson Method carry out two iterations.

(For Electronics Group and Electrical Group)

(COMPLEX NUMBER)

2 marks-

- 1) Find modulus and amplitude of $-1 + i\sqrt{3}$
- 2) If $Z_1 = 4 - 5i$ and $Z_2 = 3 + 7i$ find $|3Z_1 - 2Z_2|$ and $\left|\frac{Z_1}{Z_2}\right|$
- 3) If $Z = 1 + 2i$ find value of $Z^2 - 2Z + 6$
- 4) Express in $(x + iy)$ form $\frac{2-3i}{1+2i}$

4 marks:

- 1) Express in polar form $(-2 - 2\sqrt{3}i)$
- 2) Show that $(1 + i)^8 + (1 - i)^8 = 32$.
- 3) Find real and imaginary parts of z^{-1} where $z = \frac{3+4i}{1-i}$.

(LAPLACE TRANSFORM)

2 marks-

- 1) Obtain : $L\{5 + 2t - e^{-t}\}$
- 2) Obtain : $L\{5 \sinh 3t - 3 \cos 4t\}$
- 3) Obtain : $L\{\sin^3 t\}$
- 4) Obtain : $L^{-1}\left\{\frac{2}{s-3} + \frac{3s}{s^2+9} + \frac{4}{s^2+16}\right\}$
- 5) Obtain : $L^{-1}\left\{\frac{6}{3s-2} + \frac{s}{s^2+2}\right\}$

4 marks:

- 1) Use Laplace transform to solve the differential equation:

$$y' - y = 3.e^{-2t}, \text{ if } y(0) = -1.$$

- 2) Solve using Laplace transform $\frac{dx}{dt} + 2x = e^{-t}$ given that $x(0) = 2$.
- 3) Solve using Laplace transform $3y' - 2y = 4.e^{2t}$ given: $y = 1$ when $t = 0$.
- 4) Use Laplace transform to solve the differential equation:

$$\frac{dy}{dx} = 3y + 1 - e^t, \text{ given : } y = -1 \text{ when } t = 0.$$

(For Civil Group)

(NUMERICAL INTEGRATION)

2 marks-

- 1) State the trapezoidal rule of numerical integration.
- 2) State the Simpson's $\frac{3}{8}$ th rule of numerical integration.
- 3) State the Simpson's one-third rule of numerical integration.

4 marks:

- 1) Evaluate : $\int_2^7 \frac{dx}{x}$ using Trapezoidal rule , taking n= 5.
- 2) Evaluate : $\int_0^1 \frac{dx}{1+x^2}$ BY Trapezoidal rule , taking n = 4.Hence,obtain approx.. value of π .
- 3) 5 Using Trapezoidal rule , calculate the approximate value of $\int_0^4 \sqrt{x} dx$ given by

x	0	1	2	3	4
Y = \sqrt{x}	0	1	1.414	1.7321	2

- 4) Using Simpson's $\frac{3}{8}$ th rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.
- 5) Obtain $\int_0^1 \frac{dx}{x+2}$ using Simpson's one –third rule , by dividing the interval [1 , 5] into 4 equal sub intervals.
- 6) Using Simpson's one third rule , evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cos x} dx$. Divide the interval into eight equal sub-intervals.