

Scheme – I

Sample Question Paper

Program Name : Computer Engineering Program Group
Program Code : CO/CM/IF/CW
Semester : Second
Course Title : Applied Mathematics
Max. Marks : 70

22224

Time: 3 Hrs.

Instructions:

1. All Questions are Compulsory.
2. Answer each next main Question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Non Programmable pocket calculator is allowed.
5. Programmable pocket calculator is not allowed.
6. Figures to the right indicate full marks.
7. Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Q.1 Attempt any FIVE of the following

10 Marks

- a) Define Even and Odd Functions.
- b) If $f(x) = x^3 - 3x^2 + 5$, find $f(0) + f(3)$.
- c) Find $\frac{dy}{dx}$ if $y = (x + 1) \cdot \log(x + 1)$
- d) Evaluate: $\int (e^x + x^e + e^e) dx$
- e) Evaluate : $\int \frac{dx}{2x + 1}$
- f) Find the area bounded by the curve $y = x$, X-axis & the ordinates $x = 0$, $x = 4$.
- g) Find a real root of the equation $x^3 - 4x - 9 = 0$ in the interval $(2, 3)$ by using bisection method (Use two iterations).

Q.2 Attempt any THREE of the following

12 Marks

- a) Find $\frac{dy}{dx}$ if $x^2 + y^2 - xy - 2x + 5y - 6 = 0$ at $(1, 2)$

- b) If $x = 3 \cos t - 2 \cos^3 t$ and $y = 3 \sin t - 2 \sin^3 t$ find $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$
- c) In a potentiometer circuit R is given by $R = \frac{1}{x} - \frac{1}{x-a}$ where a is constant. Find the value of x for which R is minimum. Also find minimum value of R.
- d) A telegraph wire hangs in the form of a curve $y = a \log \left\{ \sec \left(\frac{x}{a} \right) \right\}$. Show that the curvature at any point is $\frac{1}{a} \cdot \cos \left(\frac{x}{a} \right)$

Q.3 Attempt any THREE of the following

12 Marks

- a) Find the equation of tangent & normal to the curve $13x^3 + 2x^2y + y^3 = 1$ at $(1, -2)$.
- b) Find $\frac{dy}{dx}$ if $y = x^{\sin x} + (\tan x)^x$
- c) If $e^y = y^x$ prove that $\frac{dy}{dx} = \frac{(\log y)^2}{\log y - 1}$
- d) Evaluate: $\int \frac{dx}{x + \sqrt{x}}$

Q.4 Attempt any THREE of the following

12 Marks

- a) Evaluate: $\int \frac{dx}{3x^2 + 4x + 1}$ dx
- b) Evaluate: $\int \frac{dx}{5 - 4 \cos x}$
- c) Evaluate: $\int x \cdot \tan^{-1} x$ dx
- d) Evaluate: $\int \frac{dx}{\cos^2 x (1 - \tan x) (2 + \tan x)}$
- e) Evaluate: $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt[n]{\cot x}}$

Q.5 Attempt any TWO of the following

12 Marks

- a) Find the area enclosed by the curve $y^2 = x$ and the line $x = 4$.
- b) Attempt the following:
- i) Form the differential equation by eliminating the arbitrary constants if $y = A e^{2x} + B e^{3x}$
- ii) Solve: $e^{x+y} dx + e^{2y-x} dy = 0$

- c) An electrical circuit containing an inductance L henries, resistance R in series with an electromotive force $E \sin \omega t$ satisfies the equation $L \frac{di}{dt} + Ri = E \sin \omega t$. Find the value of the current at any time t , if initially there is no current.

Q.6 Attempt any TWO of the following

12 Marks

a) Attempt the following:

- i) Solve the following system of equations by Jacobi-Iteration method.(Two iterations)

$$10x + y + 2z = 13 ; 3x + 10y + z = 14 ; 2x + 3y + 10z = 15$$

- ii) Solve the following system of equations by using Gauss-Seidal method.(Two iterations)

$$2x + y - z = 3 ; x + y + 2z = 13 ; x + y - z = 1$$

b) Solve the following system of equations by Gauss Elimination Method.

$$4x - y - 3z = 1 ; 3x - 2y + 4z = 7 ; x + 2y + z = 2$$

c) Using Newton – Raphson method find the approximate root of the equation

$$2x^3 - 3x + 6 = 0 .(\text{Use four iterations})$$

Scheme – I

Sample Test Paper - I

(40% of 5-Unit curriculum and 50% of 6-Unit curriculum)

Program Name : Computer Engineering Program Group
Program Code : CO/CM/IF/CW
Semester : Second
Course Title : Applied Mathematics
Max. Marks : 20

22224

Time: 1 Hour

Instructions:

1. All Questions are Compulsory.
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Q.1 Attempt any **FOUR** of the following

08 Marks

- a) If $f(x) = x^2 + 6x + 10$ find $f(2) + f(-2)$.
- b) State whether the function $f(x) = \frac{a^x + a^{-x}}{2}$ is even or odd. .
- c) Find $\frac{dy}{dx}$ if $y = \frac{e^x + 1}{e^x - 1}$
- d) Find $\frac{dy}{dx}$ if $y = e^{2x} + \log_5 x + \log_7 7$
- e) At what point of the curve $y = e^x$, the slope is 1 ?
- f) Evaluate: $\int \frac{x^2 - 4x + 5}{x} dx$

Q.2 Attempt any THREE of the following

12 Marks

- a) Find $\frac{dy}{dx}$ if $y = (\sin x)^{\tan x}$
- b) Find the equation of tangent and normal to the ellipse $4x^2 + 9y^2 = 40$ at the point $(1, 2)$.
- c) Find the maximum and minimum values of $x^3 - 9x^2 + 24x$.
- d) Evaluate : $\int \frac{1}{\sin^2 x \cdot \cos^2 x} dx$

Scheme – I

Sample Test Paper - II

(60% of 5-Unit curriculum and 50% of 6-Unit curriculum)

Program Name : Computer Engineering Program Group

Program Code : CO/CM/IF/CW

Semester : Second

Course Title : Applied Mathematics

Max. Marks : 20

22224

Time: 1 Hour

Instructions:

Instructions:

1. All Questions are Compulsory.
2. Answer each next main Question on a new page.
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Q.1 Attempt any FOUR of the following .

08 Marks

a) Evaluate: $\int \frac{4^{\tan^{-1}x}}{1+x^2} dx$

b) Evaluate: $\int \frac{1}{(x+1)(x+4)} dx$

c) Evaluate: $\int_0^1 \frac{dx}{\sqrt{1+x^2}}$

d) Find the area bounded by the curve $y = x^3$, X-axis & the ordinates $x = 0$, $x = 3$.

e) Find the order & degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^4 = \left(y + \frac{dy}{dx}\right)^{3/2}$

f) Using Bisection method find the root of the equation $x^2 - x - 4 = 0$ up to two iterations between (2,3).

Q.2 Attempt any THREE of the following.

12 Marks

a) Evaluate: $\int_0^{\pi/2} \frac{dx}{1 + \sqrt{\cot x}}$

b) Solve: $x \frac{dy}{dx} - 2y = x^3$

c) Using Regula –Falsi method find approximate root of $x^2 + x - 3 = 0$ in the interval (1, 2) (Three iterations only)

d) Solve the following system of equations by Gauss Elimination Method.

$$x + y + z = 4; 2x + y + z = 5; 3x + 2y + z = 7$$