Question bank for third internal

Part-1 (Similar problems)

A

1. Using suitable interpolation formula, find $y(38)$ for the following data:

x	40	50	60	70	80	90
y	184	204	226	250	276	304

2. Find the polynomial interpolating the data

x	0	1	2	3
$f(x)$	1	2	1	10

3. The following data is on melting point of an alloy of lead and zine where t is temperature in celsius and P is percentage of lead alloy. Find the melting point of the alloy containing 86% of lead.

P	40	50	60	70	80	90
t	184	204	226	250	276	304

4. Given

x	1	2	3	4	5	6	7	8
$f(x)$	1	8	27	64	125	216	343	512

Estimate $f(7.5)$ using Newton-Gregory Backward difference interpolation formula.

5. Using the Lagrange's formula find $y(4)$.

x	0	1	2	5
y	2	3	12	147

6. The following table gives the premium payable at ages in years completed. Interpolate the premium payable at age 35 completed using Lagrange's formula. (5 Marks)

$x =$ Age completed	25	30	40	60
$y =$ Premium in Rs	50	55	70	95

B.

1. Given the values

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Evaluate $f(9)$, using Newton's divided difference formula.

2. Evaluate $f(5)$ using divided difference formula, given $f(0) = -5$, $f(1) = -14$, $f(4) = -125$, $f(8) = -21$, $f(10) = 355$

3. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's one-third rule by taking 8 sub intervals.

4. Find an approximate value of $\log_e 5$, by Simpson's 1/3 rule, from $\int_0^5 \frac{dx}{4x+5}$, dividing the range into 6 equal parts.

5. Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\, d\theta$ by Simpson's $\frac{3}{8}th$ rule by taking 7 ordinates.

6. Compute the value of $\int_{0.2}^{1.4} (\sin x - \log x + e^x)\, dx$ using Simpson's $\frac{3}{8}$ th rule taking six parts.

Part-2(Similar problems)

A

1. Using Taylor's series method, solve $y' = x + y^2$, $given\ y(0) = 1$, at $x = 0.1$, considering upto 3rd degree term.
2. Find an approximate value of y when $x = 1.1$, if $\frac{dy}{dx} = 1 - x^2y$, $given\ y(1) = 0$, using Taylor's method.
3. Using modified Euler's method, find an approximate value of y when $x = 0.1$, given $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$. Perform two iterations.
4. Using modified Euler's method, find an approximate value of y when $x = 1.1$, given $\frac{dy}{dx} = 2x - \frac{y}{x}$, $given\ y(1) = 1$

B

1. Using fourth order Runge-Kutta method find the solution of $10\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ at $x = 0.2$.
2. Using Runge-Kutta method of fourth order, find an approximate value of y when $x = 0.1$, given $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$.

C

1. Given $\frac{dy}{dx} = x - y^2$and $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$, evaluate $y(0.8)$ by Milne's method.
2. Given $\frac{dy}{dx} = x^2(1 + y)$ and $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$, evaluate $y(1.4)$ by Milne's method.

Question paper pattern

Part- I		
1. a) 4 Marks b) 4 Marks	**Or**	2. a) 4 Marks b) 4Marks
Part- 2		
3. a) 4 Marks b) 4 Marks c) 4 Marks	**Or**	4. a) 4 Marks b) 4 Marks c) 4 Marks