## 22201

12223													
<b>3</b> Hou	irs	/	70	Marks	Seat	No.							
Instructions	_	(1)	All Questions	s are Comp	ulsory								
			(2)	Answer each	next main	Quest	tion	on	a no	ew	pag	e.	
		(3)	Illustrate you: necessary.	r answers v	with n	eat :	sket	ches	wł	nere	ever		
		(4)	Figures to the	e right ind	icate f	ùll 1	nark	۲S.					
		(5)	Use of Non-J Calculator is	programmat permissible	ole Ele e.	ectro	nic	Poc	ket				
		(6)	Mobile Phone Communication Examination	e, Pager an on devices Hall.	d any are no	oth ot pe	er E ermi	Elect ssib	roni le i	ic n			
		(7)	Programmable	e Pocket C	alculat	or is	s no	ot al	low	red.			
											Ma	rks	
<b>1.</b> <i>A</i>	Atten	npt	any	<b><u>FIVE</u></b> of the	following	:							10
a) I	Defin	e (	Odd a	and Even func	ctions.								

- b) If f(x) = 3x + a and f(1) = 7, find a and f(4).
- c) If  $y = x^{10} + 10^x + e^x + \log x$  find  $\frac{dy}{dx}$ .
- d) Evaluate  $\int x \log x \, dx$
- e) Evaluate  $\int \frac{1}{1 \cos 2x} dx$
- f) Using integration, find the area of the region bounded by the lines 2y + x = 8, x-axis and the lines x = 2 and x = 4.
- g) State the Simpson's one-third rule of numerical integration.

2. Attempt any THREE of the following: 12 a) Find  $\frac{dy}{dx}$  if  $y = \log[\operatorname{cosec} x - \operatorname{cot} x]$ . b) Find  $\frac{dy}{dx}$  if  $x = \sec^2\theta$ ,  $y = \tan^3\theta$  at  $\theta = \frac{\pi}{3}$ . c) A beam is bent in the form of the curve  $y = 2\sin x - \sin 2x$ . Find the radius of curvature at  $x = \frac{\pi}{2}$ d) A telegraph wire hangs in the form of a curve  $y = a \log \sec(\frac{x}{a})$  where a is constant show that the curvature at any point is  $\frac{1}{a}\cos(\frac{x}{a})$ . 3. Attempt any THREE of the following: a) Find the equation of the tangent and 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  $y = \log(x\sin 2x)$  find  $\frac{dy}{dx}$ . d) Evaluate  $\int \frac{e^x(x+1)}{\sin^2(re^x)} dx$ . Attempt any THREE of the following: **4**. 12 a) Evaluate  $\int \frac{1}{9r^2 + 6r + 10} dx$ b) Evaluate  $\int \frac{1}{3 + 2\sin x + \cos x} dx$ c) Evaluate  $\int x^2 - e^{3x} dx$ d) Evaluate  $\int \frac{\cos x}{(4 + \sin x)(3 + \sin x)} dx$ e) Evaluate  $\int_{-\infty}^{\frac{\pi}{2}} \frac{\sqrt[3]{\sec x}}{\sqrt[3]{\sec x} + \sqrt[3]{\cos ex}} dx$ 

Marks

12

## 5. Attempt any <u>TWO</u> of the following:

- a) Find the area cut off from the parabola  $4y = 3x^2$  with the line 2y = 3x + 12.
- b) Attempt the following
  - i) Form the differential equation from the relation  $y = Ae^{3x} + Be^{-3x}$  where A & B are arbitrary constant's.
  - ii) Solve  $(x^2 yx^2)dy + (y^2 + xy^2)dx = 0$ .
- c) A right circular cone has height 9 cm and radius of the base 5 cm. It is inverted and water is poured into it. If at any instant the water level rises at the rate of  $\left(\frac{\pi}{A}\right)$  cm/sec, where A is the area of the water surface at that instant, show that the vessel will be full in 75 seconds.

## 6. Attempt any <u>TWO</u> of the following:

- a) Attempt the following
  - i) Evaluate  $\int_{3}^{3} \log_{e} x \, dx$  using Trapezoidal rule from the following data

x	3	4	5	6	7	8
$\log_{e} x$	1.0986	1.3863	1.6094	1.7918	1.9459	2.0794

ii) Apply Simpson's one-third rule to find  $\int_{0}^{2} f(x) dx$  using the following data.

x	0	1.0	1.5	2.0
f(x)	1.1	2.4	5.7	8.1

- b) Evaluate  $\int_{0}^{\frac{\pi}{2}} \cos x \, dx$  using Simpson's  $\frac{3}{8}$  rule with n = 8.
- c) Evaluate  $\int_{1}^{5} \frac{1}{x+2} dx$  using Simpson's one third rule. Divide the interval [1, 5] into 4 equal subintervals.

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