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#### NO.1 INSTITUTE FOR IAS/IFoS EXAMINATIONS



# MATHEMATICS CLASSROOM TEST 2020-21

Under the guidance of K. Venkanna

## **MATHEMATICS**

**ODE CLASS TEST** 

Date: 23 June-2020 Timing: 2:00 PM to 5:00 PM
Time: 03:00 Hours Maximum Marks: 250

#### INSTRUCTIONS

- 1. Write your details in the appropriate space provided on the right side.
- Answer must be written in the medium specified in the admission Certificate issued to you, which must be stated clearly on the right side. No marks will be given for the answers written in a medium other than that specified in the Admission Certificate.
- 3. Candidates should attempt All Question.
- 4. The number of marks carried by each question is indicated at the end of the question. Assume suitable data if considered necessary and indicate the same clearly.
- 5. Symbols/notations carry their usual meanings, unless otherwise indicated.
- 6. All answers must be written in blue/black ink only. Sketch pen, pencil or ink of any other colour should not be used.
- 7. All rough work should be done in the space provided and scored out finally.
- 8. The candidate should respect the instructions given by the invigilator.
- The question paper-cum-answer booklet must be returned in its entirety to the invigilator before leaving the examination hall. Do not remove any page from this booklet.

READ INSTRUCTIONS ON THE LEFT SIDE OF THIS PAG CAREFULLY	
Name	
	_
Mobile No.	

Email.: (In Block Letter)	
,	

Medium
I have read all the instructions and shall

Test Centre

abide by them

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I have verified the information filled by the candidate above

Signature of the invigilator

## **INDEX TABLE**

Question	Page No.	Max. Marks	Marks Obtained
1.		20	
2.		15	
3.		10	
4.		16	
5.		10	
6.		10	
7.		20	
8.		15	
9.		12	
10.		15	
11.		15	
12.		10	
13.		10	
14.		12	
15.		15	
16.		14	
17.		15	
18.		16	

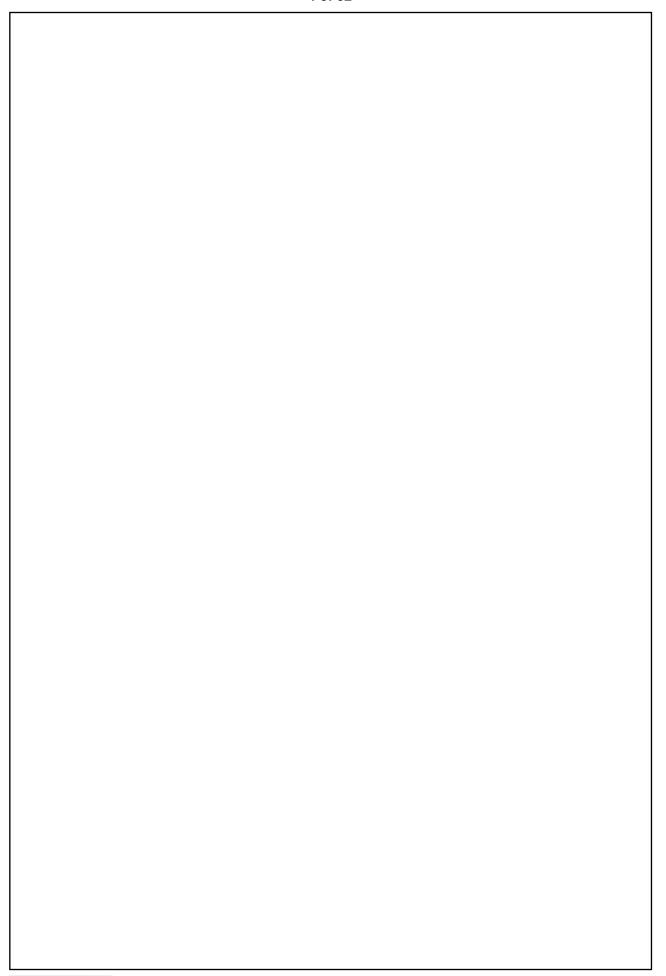
## **Total Marks**



- 1. (i) Solve  $(2x^2 + 3y^2 7)xdx (3x^2 + 2y^2 8)y dy = 0$ .
  - (ii) Solve  $(2xy^4 e^y + 2xy^3 + y)dx + (x^2 y^4 e^y x^2 y^2 3x)dy = 0$ .

(iii) If L<sup>-1</sup> 
$$\left\{ \frac{p}{\left(p^2 + 1\right)^2} \right\} = \frac{1}{2} t \sin t$$
, find L<sup>-1</sup>  $\left\{ \frac{32p}{\left(16p^2 + 1\right)^2} \right\}$  [20]







2.	Use the method of variation of parameters to solve $y'' + y = 1 / (1 + \sin x)$ . [15]

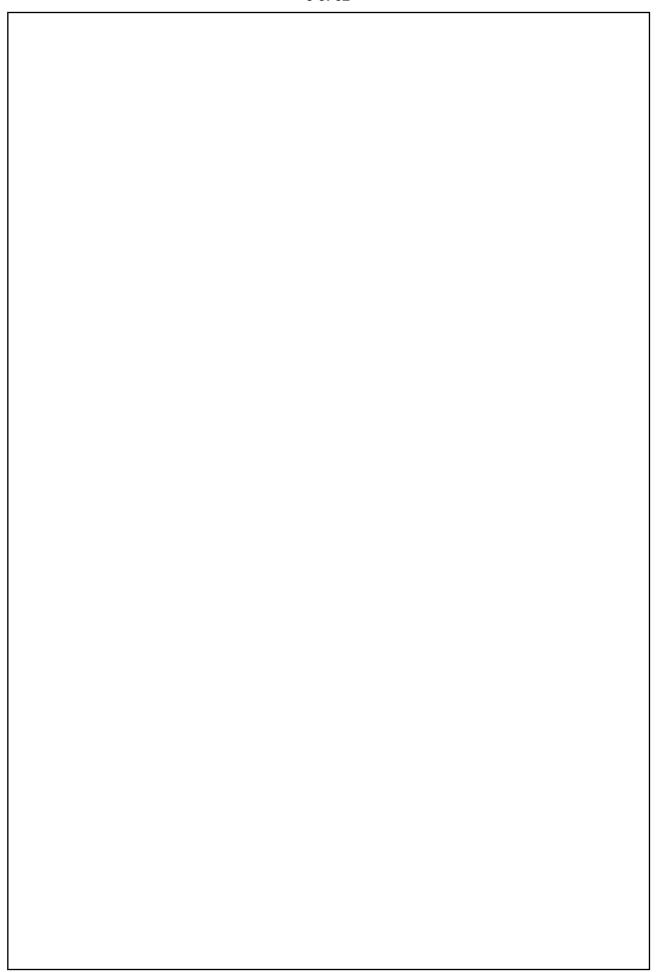


3.	Find the general and singular solution of $y^2$ ( $y-xp$ ) = $x^4p^2$ .	10]



4.	Reduce the equation $x^2y'' - 2x(1+x)y' + 2(1+x)y = x^3$ , $(x > 0)$ into the normal form and hence solve it. [16]	

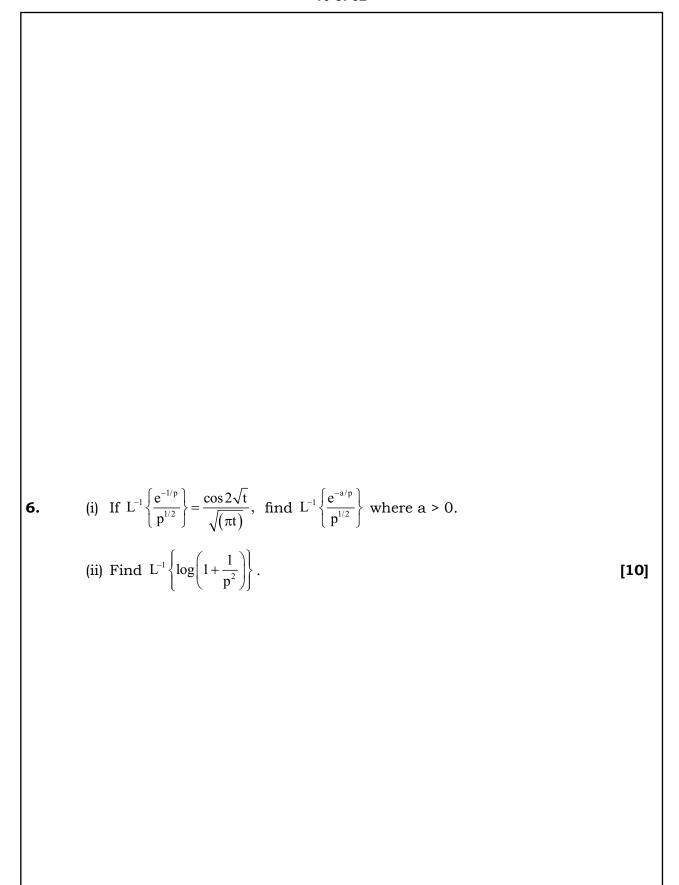






[10]	
$(x + yp)^2 = 0$	
+ p)(x + yp) +	
-2(x + y)(1 - y)	
$(1 + p)^2 - 1$	
$(x^2 + y^2)$	
<b>5.</b> Sol	
5	

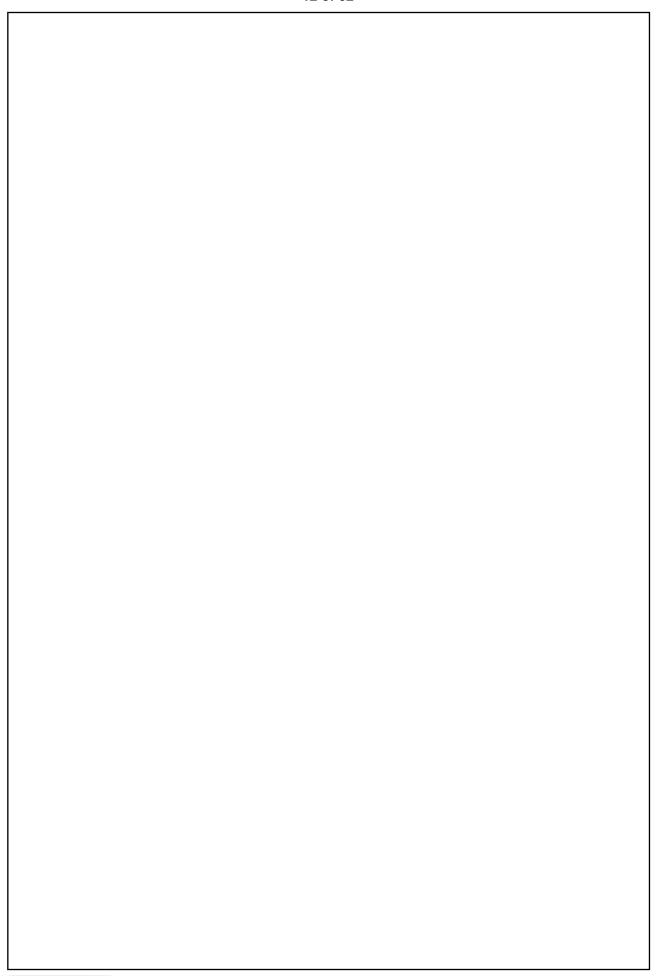






7.	(i)	Use the method of variation of parameters to find the general solution of $x^2y'' - 4xy' + 6y = -x^4 \sin x$ .
	(ii)	Solve $x^2(d^3 y / dx^3) + 2x(d^2 y / dx^2) + 2(y / x) = 10(1 + \frac{1}{x^2})$ . (10 + 10 = 20)

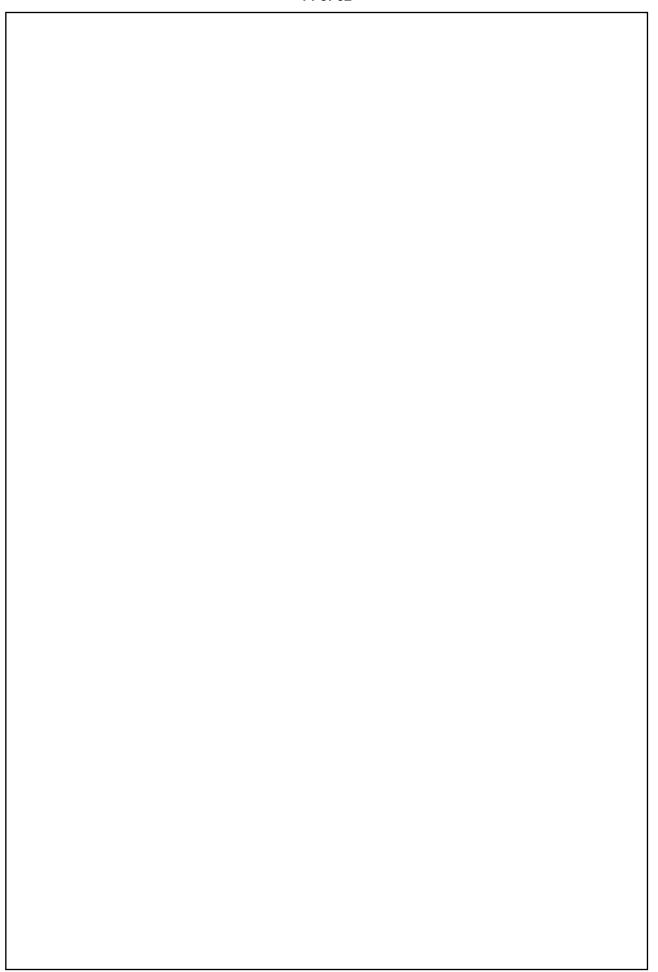






8.	Solve $(px^2 + y^2)$ $(px + y) = (p + 1)^2$ by reducing it to Clairaut's form and find its singular solution. [15]





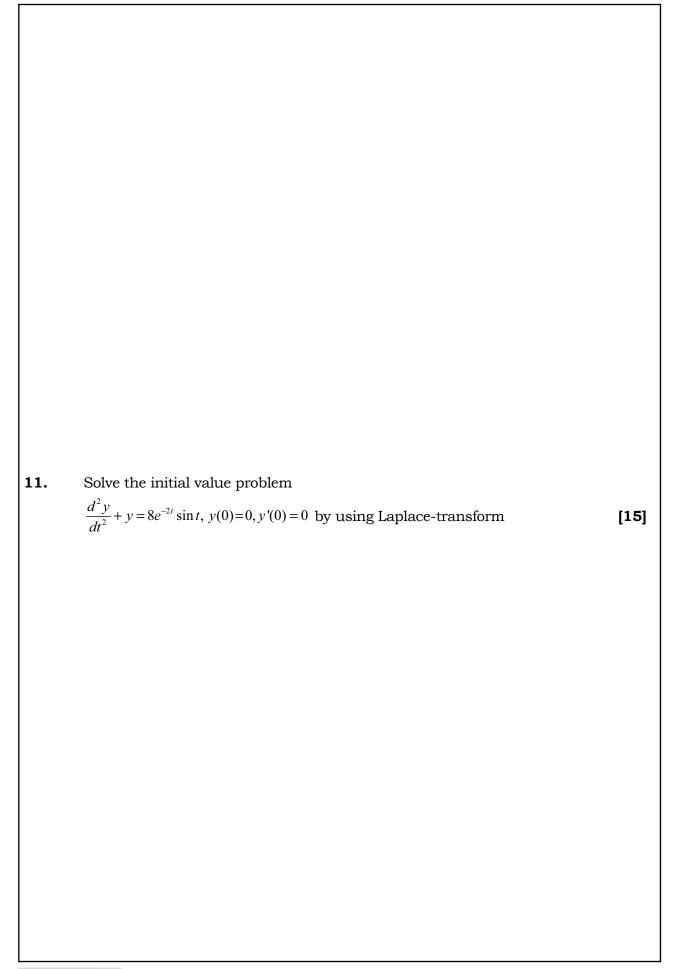


9.	(i) Solve $x(1 - x^2) dy + (2x^2y - y)dx = ax^3dx$ .	
		[12]
		• •

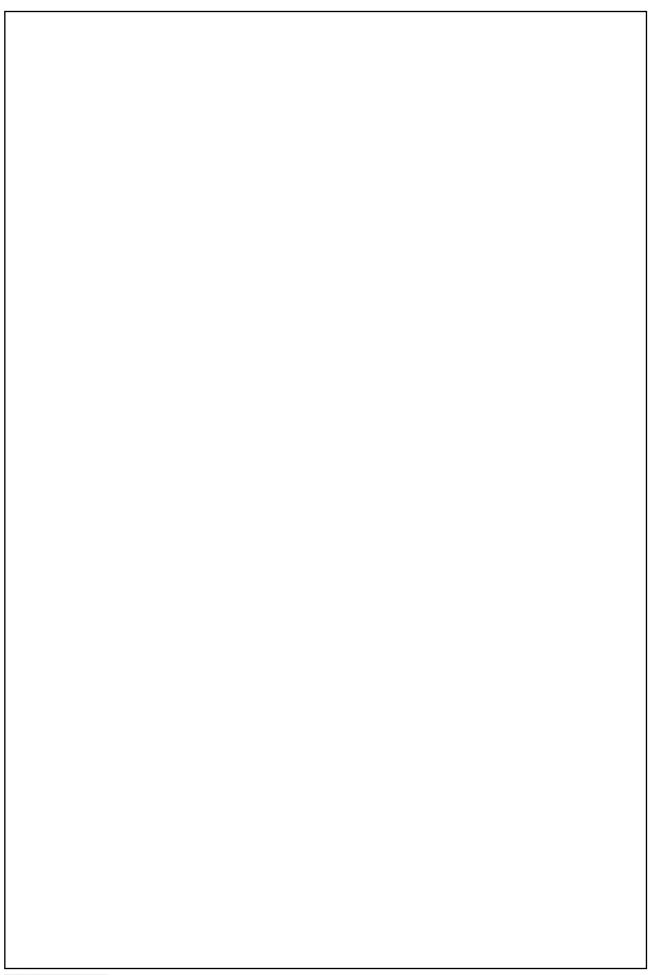


10.	By using Laplace transformation solve $(D^2 + m^2)x = a \sin nt$ , $t > 0$ , where x, Dx
	equal to $x_0$ and $x_1$ , when $t = 0$ , $n \neq m$ . [15]











12.	(i)	Find	$L^{-1}$	$\log \frac{p+3}{p+2}$
-----	-----	------	----------	------------------------

(ii) Prove that 
$$L\left\{\frac{\cos at - \cos bt}{t}\right\} = \frac{1}{2}\log \frac{s^2 + b^2}{s^2 + a^2}$$
 [10]



13.	Show graphically that $y_1(x) = x^2$ and $y_2(x) = x \mid x \mid$ one linearly independent	dent on
	Show graphically that $y_1(x) = x^2$ and $y_2(x) = x \mid x \mid$ one linearly independ $-\infty < x < \infty$ , however Wronskian vanishes for every real value of $x$ .	[10]
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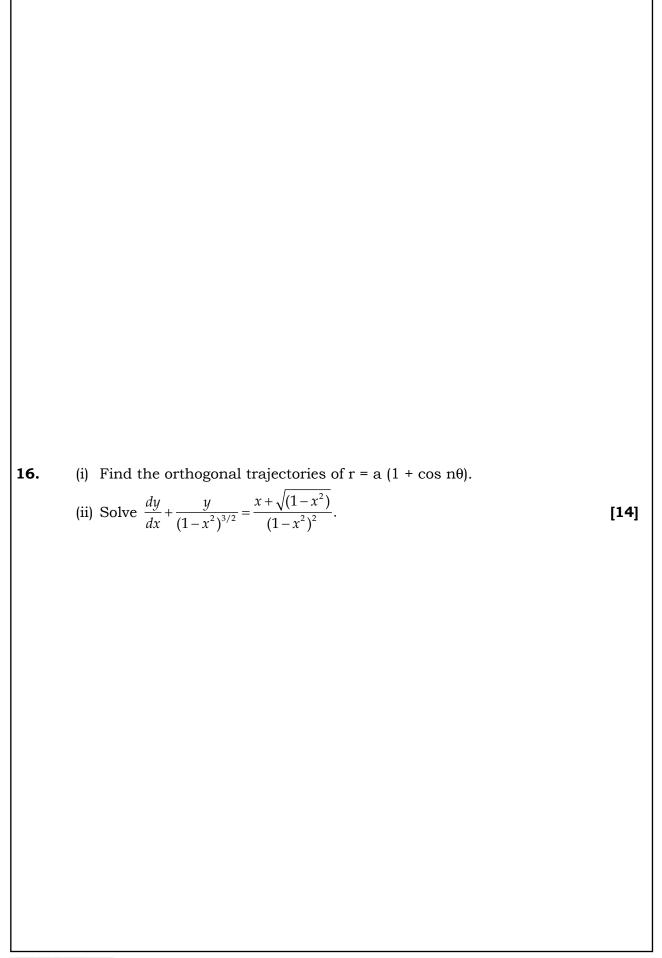


	21 of 32	
14.	Find the orthogonal trajectories of the family of curve	
	$\frac{x^2}{a^2} + \frac{y^2}{a^2 + \lambda} = 1, \lambda$ being the parameter.	[12]

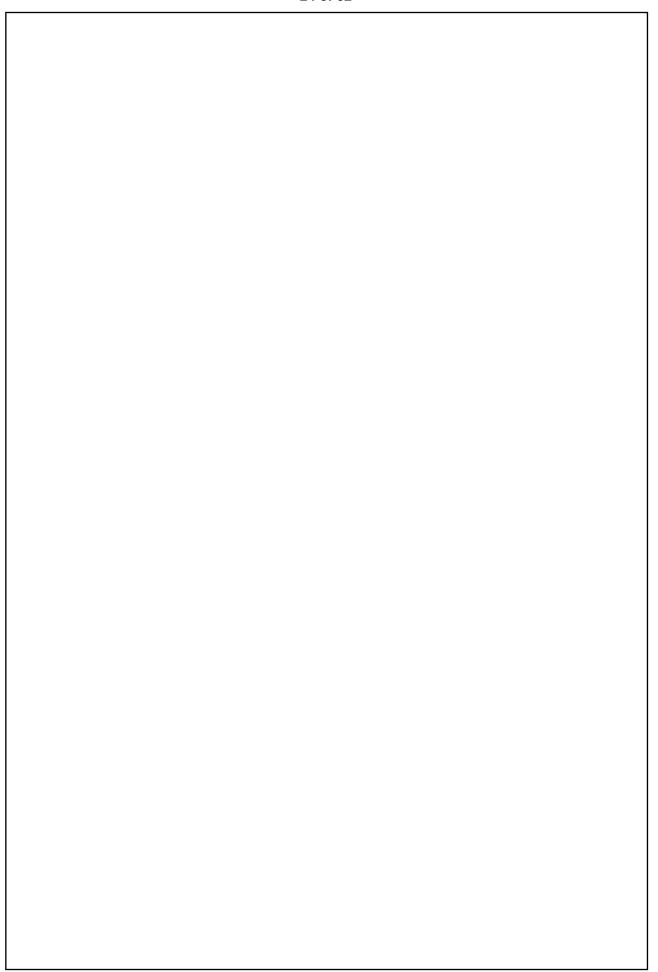


15.	Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + y = \frac{\log x \sin \log x + 1}{x}$ .	[15]







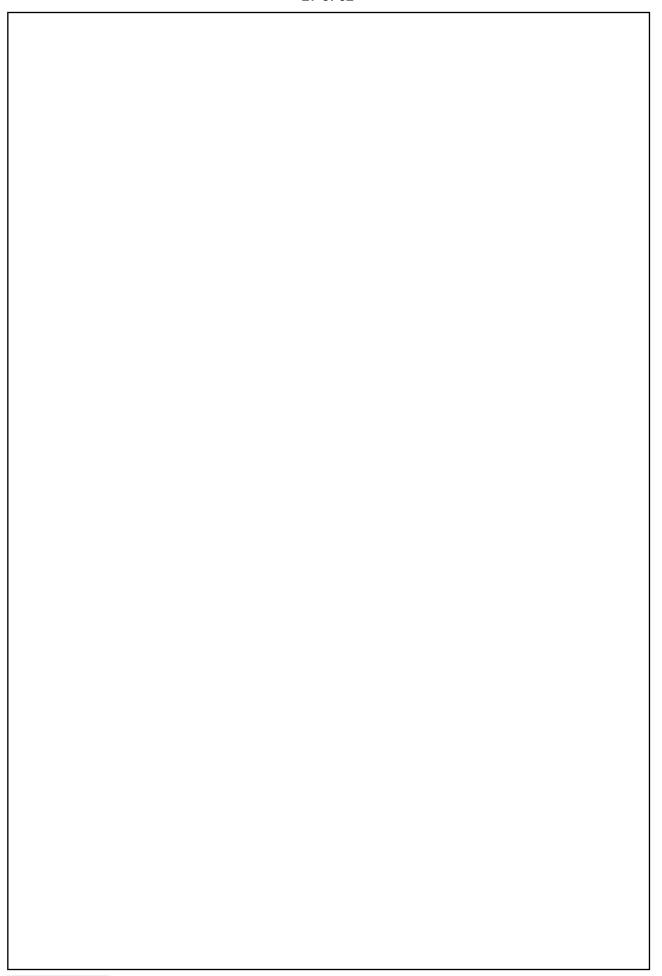




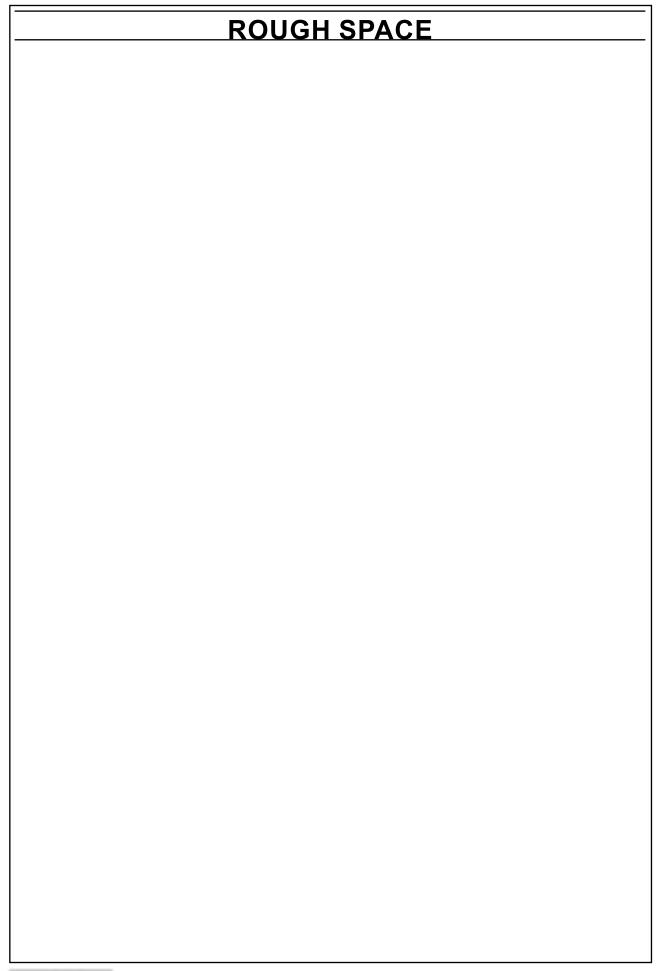


18.	<ul> <li>(i) The number of bacteria in a yeast culture grows at a rate which is proportional to the number present. If the population of a colony of yeast bacteria triples in 1 hour, find the number of bacteria which will be present at the end of 5 hours.</li> <li>(ii) Solve (D² + 1) y = x² sin 2x. [16]</li> </ul>

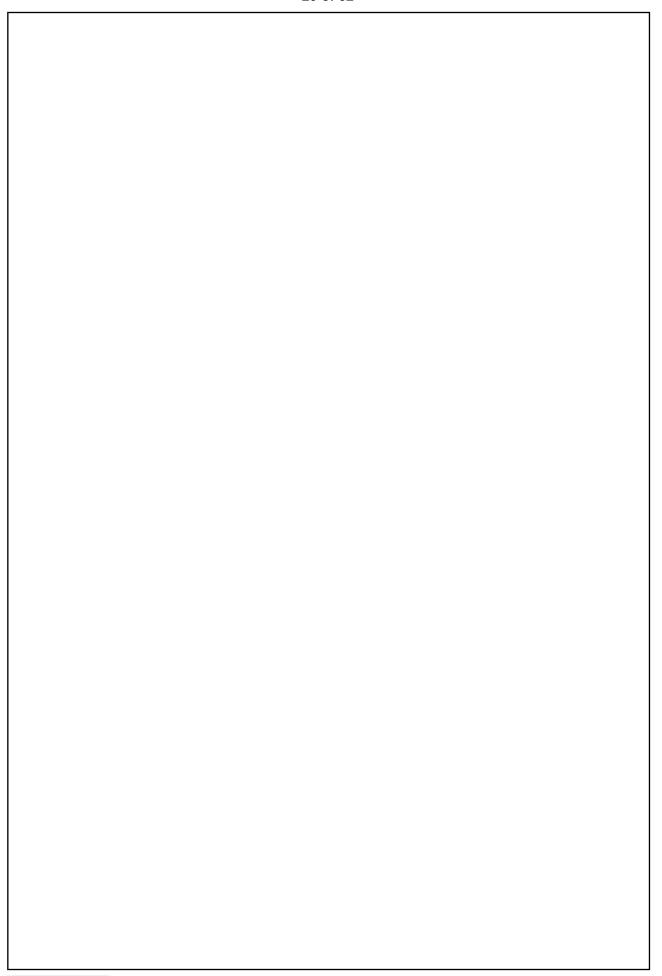




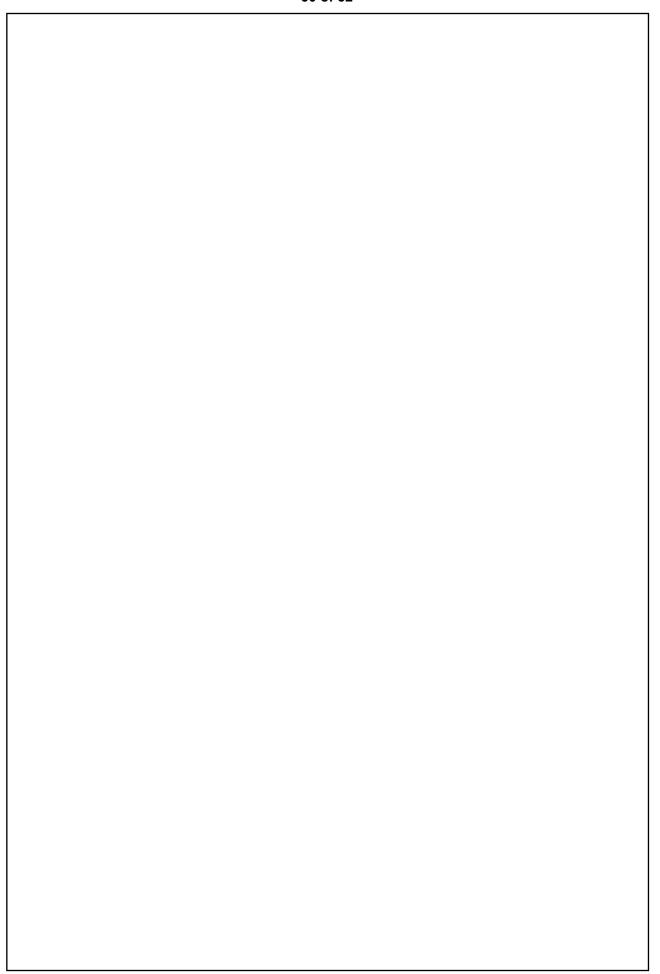














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PARTH IAISWAL AIR-05



PRATEEK JAIN AIR-03



HIMANSHU GUPTA AIR-05 IFoS-2011



SIDHARTHA GUPTA AIR-03



ASHISH REDDY MV AIR-06



VARUN GUNTUPALLI AIR-04 IFoS-2014



ANUPAM SHUKLA AIR-07



**TESWANG GYALTSON** AIR-04 IFoS-2010



AANCHAL SRIVASTAVA **AIR-09** 



**DESHAL DAN** AIR-05 IFoS-2017



HARSHVARDHAN AIR-10



CHINTAN DOBARIYA AIR-29 IFoS-2018 AIR-16



P.V.S. REDDY AIR-22 IFoS-2017



PRAKHAR GUPTA SUNNY K. SINGH AIR-24
IFOS-2017 IFOS-2017



SITANSHU PANDEY AIR-25 IFoS-2017



G. ROHITH AIR-35 IFoS-2017



AIR-36 IFoS-2017





AIR-45 IFoS-2017





PRINCE KUMAR DHARMYEER DAIRU
AIR-80 AIR-93
IFoS-2017 IFoS-2017



AIR-21 IFoS-2016



AIR22 IFoS-2016 AIR-23































































AIR-14 IFoS-2014





































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#### INDIA'S No. 1 INSTITUTE FOR IAS/IFoS EXAMINATION

#### OUR ACHIEVEMENTS IN IAS (FROM 2008 TO 2018)









































































































































































































































































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