

NO.1 INSITUTE FOR IAS/IFoS EXAMINATIONS



MATHEMATICS CLASSROOM TEST

2020-21

Under the guidance of K. Venkanna

MATHEMATICS

PDE CLASS TEST

Date: 07 August-2020

Timing : 2:15 PM to 4:45 PM

Time: 03:00 Hours

Maximum Marks: 250

INSTRUCTIONS

1. Write your details in the appropriate space provided on the right side.
2. 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.
9. 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 PAGE CAREFULLY

Name

Mobile No.

Email.: (In Block Letter)

Test Centre

Medium

I have read all the instructions and shall abide by them

Signature of the Candidate

I have verified the information filled by the candidate above

Signature of the invigilator

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(8)		18	
(9)		18	
(10)		18	
(11)		18	
(12)		18	
(13)		18	
(14)		16	
(15)		20	

Total Marks

1. (i) Form a partial differential equation by eliminating the arbitrary function ϕ from $\phi(x + y + z, x^2 + y^2 - z^2) = 0$. What is the order of this partial differential equation ?
- (ii) Find the surface whose tangent planes cut off an intercept of constant length k from the axis of z . **[6+10=16]**

2. Solve the following differential equation :
 $(D^3 - 4D^2 D' + 5DD'^2 - 2D'^3) z = e^{y+2x} + (y+x)^{1/2}.$

[10]

3. (i) Find the complete integral of $(x + y)(p + q)^2 + (x - y)(p - q)^2 = 1$. [18]
(ii) Solve $(D^2 - DD' - 2D'^2 + 2D + 2D')z = e^{2x+3y} + xy + \sin(2x + y)$.

4. Reduce $y^2 \left(\frac{\partial^2 z}{\partial x^2} \right) - x^2 \left(\frac{\partial^2 z}{\partial y^2} \right) = 0$ to canonical form. [15]

5. Solve $(D^2 + DD' - 6D'^2)z = x^2 \sin(x + y)$.

[13]

6. Obtain temperature distribution $y(x, t)$ in a uniform bar of unit length whose one end is kept at 10°C and the other end is insulated. Further it is given that $y(x, 0) = 1 - x$, $0 < x < 1$. [18]

7. A string is stretched and fastened to two points l apart, Motion is started by displacing the string into the form $y = m(lx - x^2)$ from which it is released at time $t = 0$. find the displacement of any point on the string at a distance x from one end at time t . **[16]**

8. (i) Solve $(x^2D^2 - xyDD' - 2y^2D'^2 + xD - 2yD')z = \log(y/x) - (1/2)$.
 (ii) Find the integral surface of the partial differential equation $(x - y)p + (y - x - z)q = z$ through the circle $z = 1, x^2 + y^2 = 1$. **[18]**

9. Find the steady state temperature distribution in a thin rectangular plate bounded by the lines $x = 0$, $x = a$, $y = 0$, $y = b$. The edges $x = 0$, $x = a$, $y = 0$ are kept at temperature zero while the edge $y = b$ is kept at 100°C . **[18]**

10. (i) Find a surface satisfying the equation $D^2z = 6x + 2$ and touching $z = x^3 + y^3$ along its section by the plane $x + y + 1 = 0$.
- (ii) Form partial differential equation by eliminating arbitrary functions f and g from $z = f(x^2 - y) + g(x^2 + y)$.
- (iii) Solve $y^2p - xyq = x(z - 2y)$. **[8+5+5=18]**

11. Find the characteristic strips of the equation $xp + yq - pq = 0$ and then find the equation of the integral surface through the curve $z = x/2, y = 0$. **[18]**

12. (i) Find the family orthogonal to $\phi[z(x+y)^2, x^2 - y^2] = 0$.
(ii) Reduce $y^2(\partial^2 z / \partial x^2) + x^2 (\partial^2 z / \partial y^2) = 0$ to canonical form

[2+12=18]

- 13.** (i) Form the differential equation by eliminating a and b from $z = (x^2 + a)(y^2 + b)$.
 (ii) Form a partial differential equation by eliminating the function ϕ from $lx + my + nz = \phi(x^2 + y^2 + z^2)$.
 (iii) Find the equation of the integral surface of the differential equation $2y(z - 3)p + (2x - z)q = y(2x - 3)$ which passes through the circle $z = 0, x^2 + y^2 = 2x$.

[5+5+8=18]

14. (i) Solve $y^2(x - y)p + x^2(y - x)q = z(x^2 + y^2)$
- (ii) Solve $(\partial^2 z / \partial x^2) - (\partial^2 z / \partial y^2) + (\partial z / \partial x) + 3 (\partial z / \partial y) - 2z = e^{x-y} - x^2y$ [6+10=16]

15. A thin annulus occupies the region $0 < a \leq r \leq b, 0 \leq \theta \leq 2\pi$. The faces are insulated. Along the inner edge the temperature is maintained at 0°C , while along the outer edge the temperature is held at $T = K \cos \frac{\theta}{2}$, where K is a constant. Determine the temperature distribution in the annulus. [20]

ROUGH SPACE

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OUR RANKERS AMONG TOP 10 IN IFoS



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IFoS-2016



PRATEEK JAIN
AIR-03
IFoS-2016



SIDHARTHA GUPTA
AIR-03
IFoS-2014



VARUN GUNTUPALLI
AIR-04
IFoS-2014



TESWANG GYALTSON
AIR-04
IFoS-2010



DESHAL DAN
AIR-05
IFoS-2017



PARTH JAISWAL
AIR-05
IFoS-2014



HIMANSHU GUPTA
AIR-05
IFoS-2011



ASHISH REDDY MV
AIR-06
IFoS-2015



ANUPAM SHUKLA
AIR-07
IFoS-2012



AANCHAL SRIVASTAVA
AIR-09
IFoS-2018



HARSHVARDHAN
AIR-10
IFoS-2017



SAURABH KUAMR
AIR-16
IFoS-2018



CHINTAN DOBARIYA
AIR-29
IFoS-2018



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



PRAKHAR GUPTA
AIR-23
IFoS-2017



SUNNY K. SINGH
AIR-24
IFoS-2017



SITANSHU PANDEY
AIR-25
IFoS-2017



G. ROHITH
AIR-35
IFoS-2017



SUNEEL SHEORAN
AIR-36
IFoS-2017



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AIR-40
IFoS-2017



SACHIN GUPTA
AIR-45
IFoS-2017



ANKIT KUMAR
AIR-51
IFoS-2017



RUSHAL GARG
AIR-58
IFoS-2017



RAHUL K. JADHAV
AIR-68
IFoS-2017



PRINCE KUMAR
AIR-80
IFoS-2017



DHARMVEER DAIRU
AIR-93
IFoS-2017



NAVDEEP AGGARWAL
AIR-21
IFoS-2015



PRAVEEN VERMA
AIR-22
IFoS-2015



SAURABH
AIR-23
IFoS-2016



DIPESH MALHOTRA
AIR-30
IFoS-2016



MANISH K. S.
AIR-31
IFoS-2016



ASHUTOSH SINGH
AIR-32
IFoS-2016



RAJAT KUMAR
AIR-35
IFoS-2016



PIYUSH B.
AIR-36
IFoS-2016



RAVISH JAIN
AIR-48
IFoS-2016



RAHUL SHINDE
AIR-57
IFoS-2016



RAHUL KUMAR
AIR-58
IFoS-2016



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IFoS-2016



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IFoS-2016



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AIR-13
IFoS-2015



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AIR-15
IFoS-2015



MANISHA RANA
AIR-19
IFoS-2015



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AIR-30
IFoS-2015



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NITHAN RAJ TN
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IFoS-2015



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IFoS-2015



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IFoS-2014



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AIR-16
IFoS-2013



MOHIT GUPTA
AIR-29
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NITISH KUMAR
AIR-39
IFoS-2013



NAVIN P. SHETTY
AIR-72
IFoS-2013



ABDUL DAYIM
AIR-32
IFoS-2012



DILIP K. YADAV
AIR-48
IFoS-2012



RAJESH KUMAR
AIR-72
IFoS-2012



TIRUMALA SANKARAN
AIR-11
IFoS-2011



JAI YADAV
AIR-36
IFoS-2010



VIJAYA RASTRI
AIR-80
IFoS-2010



SHASHANK KUMAR
AIR-23
IFoS-2009



SUSHREE KUMAR
UP-PCS
2011























































































































































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 KANISHAK KATARIA AIR-01 (2018)	 K. VARUN REDDY AIR-07 (2018)	 TANMAY V. SHARMA AIR-10 (2018)	 G.S. PRAJESH CHANDRA AIR-64 (2018)	 MANISHA RANA AIR-67 (2018)	 DALIP KUMAR AIR-73 (2018)	 KHUSHBOO GUPTA AIR-80 (2018)	 JAY SHIVANI AIR-81 (2018)	 ANCHAL SRIVASTAVA AIR-110 (2018)	 RAUSHAN KUMAR AIR-114 (2018)	 HIMANSHU PRAJAPATI AIR-124 (2018)	 AVDRESH DIXIT AIR-158 (2018)	 SUNEEL SHEORAN AIR-192 (2018)	
 AKASH SINGH AIR-193 (2018)	 ARCHITA V. CHANDAK AIR-206 (2018)	 AVINASH C. SANDILYA AIR-215 (2018)	 SACHIN BANSAL AIR-348 (2018)	 KATTA RAVI TEJA AIR-349 (2018)	 S. GAUTAM RAJ AIR-353 (2018)	 RAJAT BHARGAVA AIR-366 (2018)	 C. VISHNU CHARAN AIR-406 (2017)	 PANKAJ KUMAWAT AIR-443 (2018)	 SANJAY SAHU AIR-526 (2018)	 KUMAR ASHISH AIR-536 (2018)	 SHURUTI KAMBOJ AIR-586 (2018)	 AYUSH KUMAR AIR-598 (2018)	 AMIT KUMAWAT AIR-600 (2018)
 ATUL PRAKASH AIR-04 (2017)	 ANUBHAV SINGH AIR-08 (2017)	 SAGAR KUMAR AIR-13 (2017)	 DESHAL DAN AIR-82 (2017)	 PRATEEK JAIN AIR-86 (2017)	 SUNNY K SINGH AIR-91 (2017)	 RAHUL SINDHE AIR-95 (2017)	 MANISH K.R.S. AIR-138 (2017)	 RAM PRAKASH AIR-162 (2017)	 ARCHIT CHANDAK AIR-184 (2017)	 HARSHAVARDAN AIR-213 (2017)	 MAYANK MANISH AIR-214 (2017)	 K. VARUN REDDY AIR-225 (2017)	 SAURABH B. AIR-235 (2017)
 SUNEEL S. AIR-250 (2017)	 NIKHIL BANSAL AIR-255 (2017)	 AVINASH C. S. AIR-391 (2017)	 PRAJESH CHANDRA AIR-512 (2017)	 DALIP KUMAR AIR-609 (2017)	 PRINCE KUMAR AIR-772 (2017)	 UTSAV KAUSHAL AIR-14 (2016)	 MANISH GURWANI AIR-18 (2016)	 AKSHAY GODARA AIR-40 (2016)	 SWAPNIL KHARE AIR-43 (2016)	 VIKALP BHARGAVA AIR-85 (2016)	 VARUN SINGLA AIR-114 (2016)	 MANI AGARWAL AIR-126 (2016)	 SHASHANK C. AIR-130 (2016)
 SUMAN SHEKHAR AIR-133 (2016)	 K. VARUN REDDY AIR-166 (2016)	 CHINMAY MITTAL AIR-235 (2016)	 VISHAL RAJ AIR-242 (2016)	 PRAJESH CHANDRA AIR-264 (2016)	 ASEEM DALAL AIR-275 (2016)	 SINGH NAVRATTA A.C. AIR-334 (2016)	 NITHAN RAJ T.N. AIR-476 (2016)	 ATUL PRAKASH AIR-558 (2016)	 KUNAL DUDAWAT AIR-669 (2016)	 RAM PRAKASH AIR-832 (2016)	 SANGEETA MAHALA AIR-946 (2016)	 ESTHER AIR-1075 (2016)	 KUMBHAKAR Y.U. AIR-08 (2015)
 ASHISH SANGWAN AIR-12 (2015)	 SIDHARTH JAIN AIR-13 (2015)	 PRATAP SINGH AIR-15 (2015)	 VALLURU KRANTHI AIR-65 (2015)	 ATUL SHARMA AIR-118 (2015)	 KETAN BANSAL AIR-155 (2015)	 VARUN GUNTUPALLI AIR-183 (2015)	 PADMANABH B. AIR-194 (2015)	 SWAPNIL KHARE AIR-197 (2015)	 SHILPI AIR-198 (2015)	 AKHIL GOEL AIR-251 (2015)	 SAURABH KATIYAR AIR-334 (2015)	 PATEL KOMAL AIR-335 (2015)	 ANKIT AIR-492 (2015)
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 B. SASHI KANT AIR-329 (2012)	 KRISHAN KANT AIR-550 (2012)	 VISHAL GARG AIR-560 (2012)	 PRADEEP MISHRA AIR-633 (2012)	 KETAN BANSAL AIR-655 (2012)	 SANJAY K. JAIN AIR-667 (2012)	 SANTOSH KUMAR AIR-849 (2012)	 MEET KUMAR AIR-944 (2012)	 HIMANSHU GUPTA AIR-07 (2011)	 ARJIT MUKHERJEE AIR-25 (2011)	 AJAY SINGH TOMAR AIR-88 (2011)	 AWAKASH KUMAR AIR-168 (2011)	 GULNEET SINGH AIR-220 (2011)	 AJIT P. SINGH AIR-288 (2011)
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