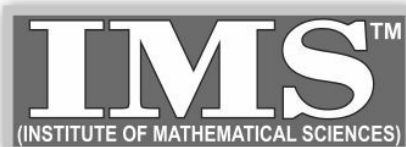


## A CONSOLIDATED QUESTION PAPER-CUM-ANSWER BOOKLET



## MAINS TEST SERIES-2019

(JUNE-2019 to SEPT.-2019)

Under the guidance of K. Venkanna

## MATHEMATICS

PAPER - I : LINEAR ALGEBRA, CALCULUS &amp; 3D

TEST CODE: TEST-1: IAS(M)/09-JUNE.-2019

Time: 3 Hours

Maximum Marks: 250

## INSTRUCTIONS

1. This question paper-cum-answer booklet has 44 pages and has 34 PART/SUBPART questions. Please ensure that the copy of the question paper-cum-answer booklet you have received contains all the questions.
2. Write your Name, Roll Number, Name of the Test Centre and Medium in the appropriate space provided on the right side.
3. A consolidated Question Paper-cum-Answer Booklet, having space below each part/sub part of a question shall be provided to them for writing the answers. Candidates shall be required to attempt answer to the part/sub-part of a question strictly within the pre-defined space. Any attempt outside the pre-defined space shall not be evaluated. "
4. 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.
5. Candidates should attempt Question Nos. 1 and 5, which are compulsory, and any **THREE** of the remaining questions selecting at least **ONE** question from each Section.
6. 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.
7. Symbols/notations carry their usual meanings, unless otherwise indicated.
8. All questions carry equal marks.
9. All answers must be written in blue/black ink only. Sketch pen, pencil or ink of any other colour should not be used.
10. All rough work should be done in the space provided and scored out finally.
11. The candidate should respect the instructions given by the invigilator.
12. 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

Roll No.

Test Centre

Medium

Do not write your Roll Number or Name anywhere else in this Question Paper-cum-Answer Booklet.

-----

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

## IMPORTANT NOTE:

Whenever a question is being attempted, all its parts/ sub-parts must be attempted contiguously. This means that before moving on to the next question to be attempted, candidates must finish attempting all parts/ sub-parts of the previous question attempted. This is to be strictly followed. Pages left blank in the answer-book are to be clearly struck out in ink. Any answers that follow pages left blank may not be given credit.

**DO NOT WRITE ON  
THIS SPACE**

## INDEX TABLE

QUESTION	No.	PAGENO.	MAX.MARKS	MARKSOBTAINED
1	(a)			
	(b)			
	(c)			
	(d)			
	(e)			
2	(a)			
	(b)			
	(c)			
	(d)			
3	(a)			
	(b)			
	(c)			
	(d)			
4	(a)			
	(b)			
	(c)			
	(d)			
5	(a)			
	(b)			
	(c)			
	(d)			
	(e)			
6	(a)			
	(b)			
	(c)			
	(d)			
7	(a)			
	(b)			
	(c)			
	(d)			
8	(a)			
	(b)			
	(c)			
	(d)			
Total Marks				

**DO NOT WRITE ON  
THIS SPACE**

**SECTION – A**

1. (a) Determine the angle between the vectors  $\mathbf{u} = (1, 0, 0)$  and  $\mathbf{v} = (1, 0, 1)$  in  $\mathbf{R}^3$ .  
**[10]**

1. (b) The transformation  $T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} -y \\ -x \end{bmatrix}$  defines a reflection in the line  $y = -x$ . show that  $T$  is linear transformation. Determine the standard matrix of this transformation. Find the image of  $\begin{bmatrix} 4 \\ 1 \end{bmatrix}$ .  
**[10]**

1. (c) If  $u = \sin^{-1} \frac{x^2 + y^2}{x + y}$ , show that :

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \tan^3 u. \quad (10)$$

1. (d) Show that :

$$\int_0^{\pi/2} \frac{\sin^2 x \, dx}{\sin x + \cos x} = \frac{1}{\sqrt{2}} \log(1 + \sqrt{2})$$

[10]

1. (e) P is a point on the plane  $lx + my + nz = p$ . A point Q is taken on the line OP such that  $OP \cdot OQ = p^2$ , prove that the locus of Q is  $p(lx + my + nz) = x^2 + y^2 + z^2$ . [10]



2. (a) (i) Find the kernel and range of the linear operator  $T(x, y, z) = (x, y, 0)$  and describe transformation geometrically.
- (ii) If  $\alpha, \beta$  are any scalars, then prove that  $A^2 - (\alpha + \beta)A + \alpha\beta I = (A - \alpha I)(A - \beta I)$ , where  $A$  is any square matrix of order  $n$  and  $I = I_n$ .
- [23]**



2. (b) A window has the form of a rectangle surmounted by a semi-circle. If the perimeter is 40 ft., find its dimensions so that the greatest amount of light may be admitted. **[13]**

2. (c) (i) A line makes angles  $\alpha, \beta, \gamma, \delta$  with the four diagonals of a cube; prove that  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta = 4/3$ . **[08]**
- (ii) Find the equation of the planes through the intersection of the planes  $x + 3y + 6 = 0$ ;  $3x - y - 4z = 0$  and whose perpendicular distance from the origin in unity. **[06]**



3. (a) Consider the linear transformation  $T(x, y) = (3x + 4y, 5x + 7y)$  of  $\mathbf{R}^2 \rightarrow \mathbf{R}^2$ .
- (i) Prove that  $T$  is invertible and find the inverse of  $T$ .
- (ii) Determine the preimage of the vector  $(1, 2)$  [15]

3. (b) Show that the following function is discontinuous at (0,0) :

$$f(x,y) = \begin{cases} \frac{x^3 + y^3}{x - y}, & x \neq y, \\ 0, & x = y \end{cases} . \quad [10]$$

3. (c) Evaluate  $\lim_{x \rightarrow a} \left(2 - \frac{x}{a}\right)^{\tan\left(\frac{\pi x}{2a}\right)}$

[07]



3. (d) (i) Find the equation of the sphere which touches the sphere  $x^2 + y^2 + z^2 - x + 3y + 2z - 3 = 0$  at the point  $(1, 1, -1)$  and passes through the origin.
- (ii) Prove that the condition that the plane  $ux + vy + wz = 0$  may cut the cone  $ax^2 + by^2 + cz^2 = 0$  in perpendicular generators is
- $$(b + c)u^2 + (c + a)v^2 + (a + b)w^2 = 0$$
- [18]**



4. (a) (i) Solve the following homogeneous system of linear equations. Interpret the set of solutions as a subspace. Sketch the subspace of solutions.

$$x_1 + 2x_2 + 3x_3 = 0$$

$$-x_2 + x_3 = 0$$

$$x_1 + x_2 + 4x_3 = 0$$

- (ii) In any vector space  $V$ ,

(A)  $\alpha \mathbf{0} = \mathbf{0}$  for every scalar  $\alpha$ .

(B)  $0u = \mathbf{0}$  for every  $u \in V$ .

(C)  $(-1)u = -u$  for every  $u \in V$ .

[20]



4. (b) Find the volume bounded by the cylinder  $x^2 + y^2 = a^2$  and the cone  $x^2 + y^2 = z^2$ .  
[14]

4. (c) Prove that the tangent planes to the hyperboloid  $(x^2/a^2) + (y^2/b^2) - (z^2/c^2) = 1$  which are parallel to tangent planes to the cone

$$\frac{b^2c^2x^2}{c^2 - b^2} + \frac{c^2a^2y^2}{c^2 - a^2} + \frac{a^2b^2z^2}{a^2 + b^2} = 0$$

cut the surface in perpendicular generators.

[16]

**SECTION – B**

5. (a) Show that the function  $h(x) = 4x^2 + 3x - 7$  lies in the space  $\text{Span} \{f, g\}$  generated by  $f(x) = 2x^2 - 5$  and  $g(x) = x + 1$ . **[10]**

5. (b) Show that the set  $\{(1, 2, 0, 3), (4, 0, 5, 8), (8, 1, 5, 6)\}$  is linearly independent in  $\mathbf{R}^4$ . The vectors form a basis for a three-dimensional subspace  $V$  of  $\mathbf{R}^4$ . Construct an orthonormal basis for  $V$ . **[10]**



5. (c) Applying Lagrange's mean value theorem to the function defined by  $f(x) = \log(1 + x)$  for all  $x \geq 0$ , show that  $0 < [\log(1 + x)]^{-1} - x^{-1} < 1$  whenever  $x > 0$ . [10]

5. (d) A sphere of constant radius  $2k$  passes through origin and meets the axes in A, B and C. Find the locus of the centroid of the tetrahedron OABC. [10]

5. (e) Find the equations to the tangent planes to the hyperboloid  $2x^2 - 6y^2 + 3z^2 = 5$  which pass through the line  $x + 9y - 3z = 0 = 3x - 3y + 6z - 5$ . **[10]**

6. (a) (i) A square matrix A is said to be involutory if  $A^2 = I$ . Prove that the matrices

$$\begin{bmatrix} 1 & \alpha \\ 0 & -1 \end{bmatrix} \text{ and } \begin{bmatrix} 1 & 0 \\ \alpha & -1 \end{bmatrix} \text{ are involutory for all scalars } \alpha.$$

Determine all  $2 \times 2$  involutory matrices.

- (ii) Determine the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & -1 & 0 \\ -1 & 3 & 0 & -4 \\ 2 & 1 & 3 & -2 \\ 1 & 1 & 1 & -1 \end{bmatrix}$$

**[10+8=18]**



6. (b) Let

$$\left\{ v_1 = \begin{bmatrix} i \\ 1 \\ 1 \\ 1 \end{bmatrix}, v_2 = \begin{bmatrix} 1 \\ i \\ 1 \\ 1 \end{bmatrix}, v_3 = \begin{bmatrix} 1 \\ 1 \\ i \\ 1 \end{bmatrix}, v_4 = \begin{bmatrix} 1 \\ 1 \\ 1 \\ i \end{bmatrix} \right\} \text{ be as basis of } \mathbb{C}^4 \text{ and let } T \in L(\mathbb{C}^4):$$

$$Tv_1 = iv_1 + v_2 - v_3 + v_4,$$

$$Tv_2 = v_1 + iv_2 + v_3 - iv_4,$$

$$Tv_3 = -iv_1 + v_2 + iv_3 + v_4,$$

$$Tv_4 = v_1 - iv_2 + v_3 + iv_4.$$

What is the matrix of  $T^*$  with respect to this basis  $\{v_1, v_2, v_3, v_4\}$  ?

[16]



6. (c) Consider the linear operator  $T(x, y) = (2x, x + y)$  on  $\mathbf{R}^2$ . Find the matrix of  $T$  with respect to the standard basis  $B = \{(1, 0), (0, 1)\}$  of  $\mathbf{R}^2$ . Use the transformation  $A' = P^{-1}AP$  to determine the matrix  $A'$  with respect to the basis  $B' = \{(-2, 3), (1, -1)\}$ . **[16]**



7. (a) The function  $f$  defined by

$$f(x) = \begin{cases} x^2 + 3x + a, & \text{if } x \leq 1 \\ bx + 2, & \text{if } x > 1 \end{cases}$$

is given to be derivable for every  $x$ . Find  $a$  and  $b$ .

[12]

7. (b) Determine the values of p and q for which

$$\lim_{x \rightarrow 0} \frac{x(1 + p \cos x) - q \sin x}{x^3}$$

exists and equals 1.

(10)

7. (c) The temperature  $T$  at any point  $(x, y, z)$  in space is  $T = 400xyz^2$ . Find the highest temperature on the unit sphere  $x^2 + y^2 + z^2 = 1$ . **[15]**



7. (d) Evaluate the following integral  $\int_0^\infty \int_0^x x e^{-x^2/y} dx dy$  by changing the order of integration. **[13]**

8. (a) Show that the enveloping cylinder of the conicoid  $ax^2 + by^2 + cz^2 = 1$  with generators perpendicular to x-axis meets the plane  $z = 0$  in parabolas. [15]

8. (b) Find the surface generated by a line which intersects the lines  $y = a = z$  and  $x + 3z = a = y + z$  and is parallel to the plane  $x + y = 0$ . **[15]**

8. (c) Show that the surface represented by the equation

$$x^2 + y^2 + z^2 - yz - xz - xy - 3x - 6y - 9z + 21 = 0$$

is a paraboloid of revolution the coordinates of the focus being (1, 2, 3) and the equations to axis are  $x = y - 1 = z - 2$ . **[20]**





## ROUGH SPACE



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

### OUR RANKERS AMONG TOP 10 IN IFoS



PRATAP SINGH  
**AIR-01**  
IFoS-2015



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 KUMAR  
**AIR-16**  
IFoS-2018



CHINTAN DOBARIYA  
**AIR-29**  
IFoS-2018



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



PRAKHARA 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



VASU DUGGAR  
**AIR-40**  
IFoS-2017



SACHIN GUPTA  
**AIR-45**  
IFoS-2017



ANKIT KUMAR  
**AIR-51**  
IFoS-2017



RISHAL GARG  
**AIR-58**  
IFoS-2017



RAHUL K.R. JADHAV  
**AIR-68**  
IFoS-2017



PRINCE KUMAR  
**AIR-80**  
IFoS-2017



DHARMVEER DAIRU  
**AIR-93**  
IFoS-2017



NAYDEEP AGARWAL  
**AIR-21**  
IFoS-2016



PRAVEEN VERMA  
**AIR-22**  
IFoS-2016



SAURABH  
**AIR-23**  
IFoS-2016



DIPESH MAHOTRA  
**AIR-30**  
IFoS-2016



MANISH K.R. S.  
**AIR-31**  
IFoS-2016



ASHUTOSH SINGH  
**AIR-32**  
IFoS-2016



RAJAT KUMAR  
**AIR-36**  
IFoS-2016



PIYUSH B.  
**AIR-36**  
IFoS-2016



AYUSH JAIN  
**AIR-48**  
IFoS-2016



RAHUL SHINDE  
**AIR-57**  
IFoS-2016



RAHUL KUMAR  
**AIR-58**  
IFoS-2016



SANGEETA MAHALA  
**AIR-68**  
IFoS-2016



PUNEET SONKAR  
**AIR-98**  
IFoS-2016



HIMANSHU P.  
**AIR-108**  
IFoS-2016



SIDHARTHA JAIN  
**AIR-13**  
IFoS-2015



AKSHAY GODARA  
**AIR-15**  
IFoS-2015



MANISHA RANA  
**AIR-19**  
IFoS-2015



RAJEEV RANJAN  
**AIR-29**  
IFoS-2015



VIJAY SHANKAR P.  
**AIR-30**  
IFoS-2015



MD. ADIL ASHRAF  
**AIR-48**  
IFoS-2015



MAHATIM YADAV  
**AIR-62**  
IFoS-2015



KUNAL DUDAWAT  
**AIR-67**  
IFoS-2015



RAJ KUMAR  
**AIR-72**  
IFoS-2015



SUMIT KUMAR  
**AIR-74**  
IFoS-2015



NITHAN RAJ TN  
**AIR-78**  
IFoS-2015



HIMANSHU BAGRI  
**AIR-87**  
IFoS-2015



KHAGESH PEGU  
**AIR-93**  
IFoS-2015



AMNEET SINGH  
**AIR-101**  
IFoS-2015



K.Y. VIJAY  
**AIR-13**  
IFoS-2014



AMIT CHAUDHAN  
**AIR-14**  
IFoS-2014



A.K. SRIVASTAVA  
**AIR-18**  
IFoS-2014



SURYA KANT PAWAR  
**AIR-48**  
IFoS-2014



BIPIN KUMAR  
**AIR-57**  
IFoS-2014



KULRAJ SINGH  
**AIR-16**  
IFoS-2013



MOHIT GUPTA  
**AIR-29**  
IFoS-2013



NITISH KUMAR  
**AIR-39**  
IFoS-2013



NAVIN P. SHARMA  
**AIR-72**  
IFoS-2013



ABDUL QAYUM  
**AIR-32**  
IFoS-2012



DILIP K.R. YADAV  
**AIR-48**  
IFoS-2012



RAJESH KUMAR  
**AIR-72**  
IFoS-2012



TIRUMALA RAVIKIRAN  
**AIR-11**  
IFoS-2011



JAI YADAV  
**AIR-36**  
IFoS-2010



VIJAYA RATHE  
**AIR-80**  
IFoS-2010



SHAMBHU KUMAR  
**AIR-23**  
IFoS-2009



SUSHEEL KUMAR  
**UP-PCS**  
2011

ONLY IMS PROVIDES SCIENTIFIC & INNOVATIVE TEACHING  
METHODOLOGIES FULLY REVISED STUDY MATERIALS AND FULLY REVISED TEST SERIES.

HEAD OFFICE: 25/8, Old Rajender Nagar, Delhi-60. BRANCH OFFICE: 105-106, Top Floor, Mukherjee Tower Mukherjee Nagar, Delhi-9

Ph.: 011-45629987, 9999197625 www.ims4maths.com @ e-Mail: ims4maths@gmail.com

Regional Office: H.No. 1-10-237, 2nd Floor, Room No. 202 R.K'S-Kancham's Blue Sapphire Ashok Nagar, Hyderabad-20. Ph.: 9652351152, 9652661152

 KANISHAK KATARIA AIR-01 (2018)	 K. VARUN REDDY AIR-07 (2018)	 TANMAY V. SHARMA AIR-10 (2018)	 G.S. PRAVEENCHAND AIR-64 (2018)	 MANISHA RANA AIR-67 (2018)	 DALIP KUMAR AIR-73 (2018)	 KHUSHBOO GUPTA AIR-80 (2018)	 JAY SHIVANI AIR-81 (2018)	 AANCHAL 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. CHANDAN AIR-206 (2018)	 AVINASH C. SANDILA AIR-215 (2018)	 SACHIN BANSAL AIR-348 (2018)	 KATTA RAVI TEJA AIR-349 (2018)	 S. GAUTHAM RAJ AIR-353 (2018)	 RAJAT BHARGAVA AIR-366 (2018)	 C. VISHNU CHARAN AIR-406 (2017)	 PAWKU KUMAWAT AIR-443 (2018)	 SANJAY SAHU AIR-526 (2018)	 KUMAR ASHISH AIR-536 (2018)	 SHRUTITI KAMBOJ AIR-586 (2018)	 ATUSH 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 KR.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)	 PRAVEEN CHANDRA AIR-512 (2017)	 DALIP KUMAR AIR-609 (2017)	 PRINCE KUMAR AIR-772 (2017)	 UTSAV KAUSHAL AIR-14 (2016)	 MANISH GURMANI 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)	 PRAVEEN VERMA AIR-264 (2016)	 ASEEM DALAL AIR-275 (2016)	 SINGH NAMRATA 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)	 KUMBHEKAR V.V. 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 S. 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)
 UTSAV KAUSHAL AIR-500 (2015)	 AKSHAY GODARA AIR-605 (2015)	 MEET KUMAR AIR-646 (2015)	 KUNAL DUDAWAT AIR-699 (2015)	 NITHAN RAJ T.N. AIR-843 (2015)	 SURYA KANT P. AIR-886 (2015)	 PRATAP SINGH S. AIR-1060 (2015)	 NITISH K. AIR-08 (2014)	 GOWTHAM POTRU AIR-30 (2014)	 BHAVESH MISHRA AIR-58 (2014)	 K.Y. VIJAY AIR-143 (2014)	 ANKIT VERMA AIR-145 (2014)	 NIKHIL GOYAL AIR-159 (2014)	 VIJAY GOUDA G.C. AIR-175 (2014)
 VALLURU KRANTHI AIR-230 (2014)	 SWAPNIL KHARE AIR-236 (2014)	 VARUN GUNTUPALLI AIR-261 (2014)	 PARTH JAISWAL AIR-299 (2014)	 MANISH GURMANI AIR-322 (2014)	 ANURAG RAI AIR-371 (2014)	 PARAS MANI T. AIR-433 (2014)	 AJIT PRATAP SINGH AIR-436 (2014)	 NIKHIL KR. GARG AIR-608 (2014)	 RAJAT AGARWAL AIR-622 (2014)	 SAURABH KATIYAR AIR-763 (2014)	 PRATAP S. BHUKYA AIR-830 (2014)	 BIPIN KUMAR AIR-861 (2014)	 MEET KUMAR AIR-1150 (2014)
 AJIT JOHN JOSHUA AIR-78 (2013)	 SUMIT KUMAR AIR-81 (2013)	 B. SASHI KANT AIR-111 (2013)	 GOWTHAM POTRU AIR-318 (2013)	 RAVINDER SINGH AIR-333 (2013)	 ASHISH MODI AIR-350 (2013)	 PARAS M. TRIPATHI AIR-391 (2013)	 NIKHIL GOYAL AIR-399 (2013)	 NITISH K. AIR-547 (2013)	 KULRAJ SINGH AIR-552 (2013)	 VALLURU KRANTHI AIR-562 (2013)	 SANTOSH KUMAR AIR-1013 (2013)	 RAMESH RANJAN AIR-76 (2012)	 ANKIT VERMA AIR-247 (2012)
 R. 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.R. 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)	 GULMEET SINGH AIR-220 (2011)	 AJIT P. SINGH AIR-288 (2011)
 JAY YADAV AIR-372 (2011)	 RAVI VERMA AIR-485 (2011)	 MEGHA AGARWAL AIR-538 (2011)	 G.J. KRUPAKAR AIR-796 (2011)	 ABHISHEK MODI AIR-223 (2011)	 BHAGWATI P. KALAI AIR-154 (2010)	 AWAKASH KUMAR AIR-276 (2010)	 NAYNEET AGARWAL AIR-362 (2010)	 AJIT P. SINGH AIR-497 (2010)	 SHAMBU KUMAR AIR-47 (2009)	 A. ARJUN AIR-140 (2009)	 NISHA GUPTA AIR-507 (2009)	 K.V.S.R. KISHORE AIR-575 (2008)	