

## KVPY - 2015 (STREAM - SX) A Detailed Analysis by Resonance

### ABOUT KVPY

The "Kishore Vaigyanik Protsahan Yojana" (KVPY) is a program started in 1999 by the Department of Science and Technology (DST), Government of India to encourage students who are studying Basic Sciences to take up research career in Science. The aim of the program is to identify and encourage talented and motivated students to pursue career in research.

This program aims to assist the students to realize their potential and to ensure that the best scientific talent is groomed for research and development in the country. Generous fellowship and contingency grant are provided to the selected KVPY Fellows up to the pre Ph.D. level or 5 years whichever is earlier. In addition, summer camps for the KVPY Fellows are organized in prestigious research and educational institutions in the country.

The Department of Science and Technology, the nodal agency of the Government has entrusted the overall responsibility for organizing and running the KVPY Program to the Indian Institute of Science, Bangalore and set up a Management Committee and a National Advisory Committee (NAC) for overseeing its implementation. A core committee looks after both the day-to-day and academic aspects of the KVPY Program<sup>1</sup>.

### OBJECTIVES OF KVPY

- To encourage and identify talented students with interest in research area
- The program aims to assist and encourage the students to realize their research potential and to ensure that the best scientific talent is developed for research and growth in India
- Provides scholarship and grant (up to the pre-Ph.D. level) to the selected students

### BENEFITS OF KVPY

- Monthly fellowship of ₹4000 & annual contingency of ₹16000
- KVPY fellows get opportunity to spend some time in scientific institutions attending lectures by experts in different fields of science, engineering or medicine, experience a research environment with science in action, watch scientists at work, interact with scientists, visit nearby scientific research laboratories and institutions, and exchange views with other research students.
- An Identity Card is issued to each KVPY Fellow. Several national laboratories, universities and other institutions have agreed to extend special privileges like library, laboratory facilities to KVPY Fellows on production of the ID card.
- Direct Admission in various reputed colleges like, IISER, IISC etc.

<sup>1</sup> Source: KVPY Official Website (<http://kvpv.iisc.ernet.in/main/about.htm>)

## ELIGIBILITY CRITERIA FOR KVPY

**Stream SA:** Students enrolled in 11<sup>th</sup> standard (science subjects) during the academic year 2015-16 and have secured a minimum of 80% (70% for SC/ST) marks in aggregate in mathematics and science subjects in the 10<sup>th</sup> standard board examination.

**Stream SX:** Students enrolled in 12<sup>th</sup> (+2) standard (science subjects) during the academic year 2015-16 and aspiring to join undergraduate program in Basic Sciences (B.Sc./B.S./Integrated M.Sc) for the session 2016 - 17 provided they have secured a minimum of 80% (70% for SC/ST) marks in aggregate in mathematics and science subjects in the 10<sup>th</sup> standard board examination.

**Stream SB:** Students enrolled in 1st year B.Sc. /B.S. /Integrated M.Sc. during the academic year 2015-16 and have secured a minimum of 60% (50% for SC/ST) marks in aggregate in science subjects in the 12<sup>th</sup> Standard Board Examination.

## SELECTION PROCEDURE<sup>2</sup>

**Stage – 1: Aptitude Test:** The written test (multiple choice) is normally conducted in the first week of November at different centers across the country. The venue details of the test are uploaded on the KVPY website in the month of October. Test date for KVPY-2015 is Sunday, November 01, 2015.

The test is of maximum marks 100 with 80 questions with negative marking and the weightage of the test is 75%.

**Stage – 1: Interview:** Based on the performance in the aptitude test, short-listed students are invited for an interview which is the final stage of the selection procedure.

## SUBJECTS COVERED

Physics, Chemistry, Mathematics, and Biology

## FELLOWSHIPS

| BASIC SCIENCES   | MONTHLY FELLOWSHIP | ANNUAL CONTINGENCY GRANT |
|--|--------------------|--------------------------|
| SA (After Class X)   | ₹ 4,000            | ₹ 16,000                 |
| SX/SB (Class XII & during 1st to 3rd years of - B.Sc./B.S. /Integrated M.Sc. /M.S. ) | ₹ 5,000            | ₹ 20,000                 |
| SX /SB - during M. Sc. / 4th to 5th years of Integrated M.Sc. /M.S                   | ₹ 7,000            | ₹ 28,000                 |

<sup>2</sup> Source: KVPY Official Website (<http://kvpv.iisc.ernet.in/main/about.htm>)

**KVPY – 2015 (sx)**

KVPY – 2015 was conducted on Sunday, November 1<sup>st</sup>, 2015 for all of the streams.

**SX Stream:** Paper was conducted from 02:00 pm to 05:00 pm and a total number of 120 questions were asked in two parts. Both part consisted of 4 sections (Physics, Chemistry, Biology and Mathematics). In Part I, each section consists of 20 questions of 1 mark each with 0.25 negative for wrong answer. Candidate was **required to attempt any 3 sections out of 4 in Part-I**. In Part-II, each of the 4 section consisted of 10 questions of 2 mark each with 0.5 negative mark for wrong answer. Candidate was **required to attempt any 2 sections in Part-II**. Overall, 80 questions were to be attempted totaling 100 marks.

**OVERALL MARKS DISTRIBUTION**

The paper pattern was same as last year. A total number of 120 questions were asked in two parts. Both parts consisted of 4 sections (Physics, Chemistry, Biology and Mathematics). In Part I, each section consists of 20 questions of 1 mark each with 0.25 negative for wrong answer. Candidate was **required to attempt any 3 sections out of 4 in Part-I**. In Part-II, each of the 4 section consisted of 10 questions of 2 mark each with 0.5 negative mark for wrong answer. Candidate was **required to attempt any 2 sections in Part-II**. Overall, 80 questions were to be attempted totaling 100 marks.

| SUBJECTS           | SX             |             |
|--------------------|----------------|-------------|
|                    | No of Question | Total Marks |
| PHYSICS            | 30             | 40          |
| CHEMISTRY          | 30             | 40          |
| MATHEMATICS        | 30             | 40          |
| BIOLOGY            | 30             | 40          |
| <b>GRAND TOTAL</b> | <b>120</b>     | <b>160</b>  |

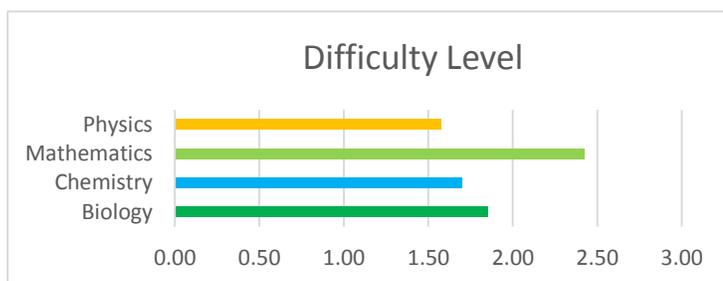
\* 80 questions were to be attempted totaling 100 marks.

## OVERALL DIFFICULTY LEVEL ANALYSIS

In this analysis we have rated every question on a scale of 1 to 3. The ratings are done by expert faculty of Resonance. The individual ratings are then averaged to calculate overall difficulty level.

- 1: Easy
- 2: Moderate
- 3: Difficult

| Subject                      | Difficulty Level |
|------------------------------|------------------|
| Physics                      | 1.58             |
| Chemistry                    | 1.70             |
| Mathematics                  | 2.43             |
| Biology                      | 1.85             |
| <b>Overall Average (B/M)</b> | <b>1.71/1.90</b> |



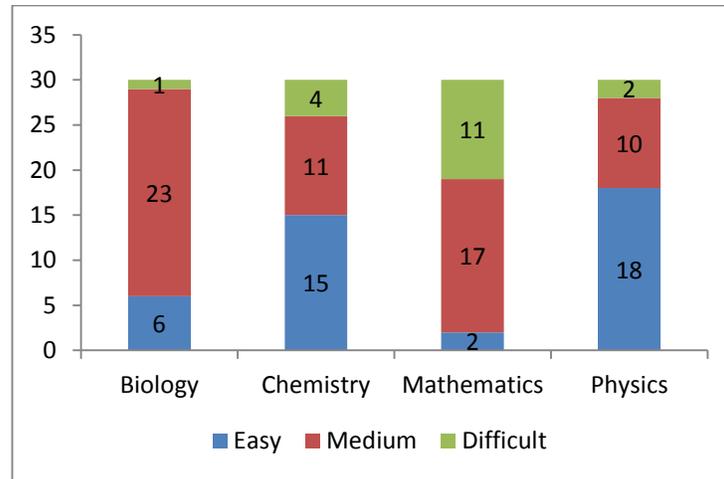
## Difficulty Level Analysis: No of Questions

| STREAM: SX               |                 |              |                 |              |                 |              |
|--------------------------|-----------------|--------------|-----------------|--------------|-----------------|--------------|
| SUBJECT                  | EASY LEVEL      |              | MEDIUM LEVEL    |              | DIFFICULT LEVEL |              |
|                          | No of Questions | Total Marks  | No of Questions | Total Marks  | No of Questions | Total Marks  |
| Physics                  | 18              | 21           | 10              | 15           | 2               | 4            |
| Chemistry                | 15              | 18           | 11              | 16           | 4               | 6            |
| Mathematics              | 2               | 2            | 17              | 19           | 11              | 19           |
| Biology                  | 6               | 7            | 23              | 32           | 1               | 1            |
| <b>GRAND TOTAL (B/M)</b> | <b>39/35</b>    | <b>46/41</b> | <b>44/38</b>    | <b>63/50</b> | <b>7/17</b>     | <b>11/29</b> |

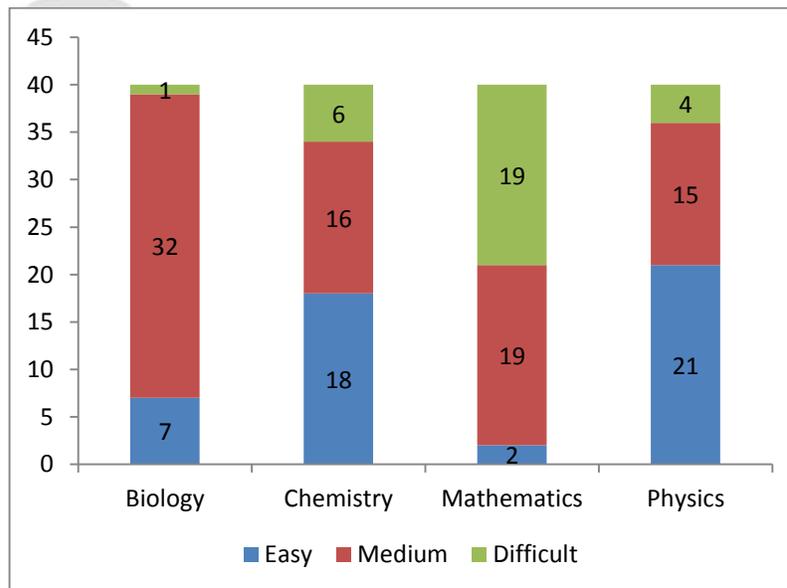
Resonance Experts feel that there was a variance in difficulty of subject papers. While Physics was on easier side compared with Chemistry & Biology, Mathematics was the Toughest. For Students Attempting Mathematics, around 41 Marks can be considered easy overall, 50 marks are relatively difficulty and 29 marks are considered difficult by Resonance Team. For Students Attempting Biology, around 46 Marks can be considered easy overall, 63 marks are relatively difficulty and 7 marks are considered difficult by Resonance Team.

Overall, it is felt that while paper is moderately difficulty, the cut-off may remain same as previous year.

## Question Wise Difficulty Breakup



## Mark Wise Difficulty Breakup



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## SUBJECT WISE ANALYSIS

### PHYSICS ANALYSIS

#### Topic wise Allocation of Marks

| Topic/Subtopic                       | No of Questions | Total Marks | % Weightage    |
|--------------------------------------|-----------------|-------------|----------------|
| <b>Overall Breakup</b>               | <b>30</b>       | <b>40</b>   | <b>100.00%</b> |
| <b>Electrodynamics</b>               | <b>7</b>        | <b>10</b>   | <b>25.00%</b>  |
| Current Electricity                  | 1               | 1           | 2.50%          |
| Electro Magnetic Field               | 3               | 4           | 10.00%         |
| Electro Magnetic Induction           | 2               | 3           | 7.50%          |
| Electrostatics                       | 1               | 2           | 5.00%          |
| <b>Heat &amp; Thermodynamics</b>     | <b>3</b>        | <b>4</b>    | <b>10.00%</b>  |
| KTG & Thermodynamics                 | 3               | 4           | 10.00%         |
| <b>Mechanics</b>                     | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Rectilinear                          | 1               | 1           | 2.50%          |
| Simple Harmonic Motion               | 1               | 1           | 2.50%          |
| <b>Mechanics</b>                     | <b>10</b>       | <b>14</b>   | <b>35.00%</b>  |
| Centre of Mass                       | 3               | 4           | 10.00%         |
| Elasticity & Viscosity               | 2               | 3           | 7.50%          |
| Friction                             | 1               | 1           | 2.50%          |
| Gravitation                          | 1               | 2           | 5.00%          |
| Rigid Body Dynamics                  | 2               | 3           | 7.50%          |
| Unit & Dimension                     | 1               | 1           | 2.50%          |
| <b>Morden Physics</b>                | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Morden Physics                       | 2               | 2           | 5.00%          |
| <b>Optics</b>                        | <b>3</b>        | <b>5</b>    | <b>12.50%</b>  |
| Geometrical Optics & Physical Optics | 2               | 4           | 10.00%         |
| Wave Optics                          | 1               | 1           | 2.50%          |
| <b>Semiconductor</b>                 | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Semiconductor                        | 2               | 2           | 5.00%          |
| <b>SHM &amp; Waves</b>               | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Sound Waves                          | 1               | 1           | 2.50%          |

## CHEMISTRY ANALYSIS

### Topic wise Allocation of Marks

| Topic/Subtopic                                     | No of Questions | Total Marks | % Weightage    |
|--|-----------------|-------------|----------------|
| <b>Overall Breakup</b>                             | <b>30</b>       | <b>40</b>   | <b>100.00%</b> |
| <b>Inorganic Chemistry I</b>                       | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Periodic Table                                     | 1               | 1           | 2.50%          |
| <b>Inorganic Chemistry-I</b>                       | <b>3</b>        | <b>3</b>    | <b>7.50%</b>   |
| Chemical Bonding                                   | 3               | 3           | 7.50%          |
| <b>Inorganic Chemistry-II</b>                      | <b>7</b>        | <b>10</b>   | <b>25.00%</b>  |
| Coordination Compounds                             | 2               | 3           | 7.50%          |
| d-block & f-block Elements                         | 3               | 4           | 10.00%         |
| Qualitative Analysis                               | 2               | 3           | 7.50%          |
| <b>Organic Chemistry -II</b>                       | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Polymers   | 1               | 1           | 2.50%          |
| <b>Organic Chemistry-1</b>                         | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Hydrocarbon  | 1               | 1           | 2.50%          |
| <b>Organic Chemistry-II</b>                        | <b>7</b>        | <b>10</b>   | <b>25.00%</b>  |
| Alkyl Halide, Alcohol & Ether (Reaction Mechanism) | 1               | 1           | 2.50%          |
| Aromatic Compounds                                 | 2               | 3           | 7.50%          |
| Biomolecules                                       | 1               | 1           | 2.50%          |
| Carboxylic Acid and their Derivatives              | 1               | 2           | 5.00%          |
| Stereoisomerism                                    | 2               | 3           | 7.50%          |
| <b>Physical Chemistry-I</b>                        | <b>5</b>        | <b>8</b>    | <b>20.00%</b>  |
| Atomic Structure & Nuclear Chemistry               | 1               | 1           | 2.50%          |
| Chemical Equilibrium                               | 1               | 2           | 5.00%          |
| Gaseous State                                      | 1               | 2           | 5.00%          |
| Ionic Equilibrium                                  | 1               | 1           | 2.50%          |
| Thermodynamics and Thermochemistry                 | 1               | 2           | 5.00%          |
| <b>Physical Chemistry-II</b>                       | <b>5</b>        | <b>6</b>    | <b>15.00%</b>  |
| Chemical Kinetics                                  | 1               | 1           | 2.50%          |
| Electrochemistry                                   | 3               | 4           | 10.00%         |
| Solid State  | 1               | 1           | 2.50%          |

## MATHEMATICS ANALYSIS

### Topic wise Allocation of Marks

| Topic/Subtopic                        | No of Questions | Total Marks | % Weightage    |
|---------------------------------------|-----------------|-------------|----------------|
| <b>Overall Breakup</b>                | <b>30</b>       | <b>40</b>   | <b>100.00%</b> |
| <b>Algebra</b>                        | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Vector                                | 1               | 1           | 2.50%          |
| <b>Binomial Theorem</b>               | <b>3</b>        | <b>5</b>    | <b>12.50%</b>  |
| Binomial Theorem                      | 3               | 5           | 12.50%         |
| <b>Complex Numbers</b>                | <b>2</b>        | <b>3</b>    | <b>7.50%</b>   |
| Complex Numbers                       | 2               | 3           | 7.50%          |
| <b>Coordinate Geometry</b>            | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Circle                                | 1               | 1           | 2.50%          |
| Parabola                              | 1               | 1           | 2.50%          |
| <b>Co-ordinate Geometry (3-D)</b>     | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Co-ordinate Geometry (3-D)            | 1               | 1           | 2.50%          |
| <b>Differential Calculus</b>          | <b>6</b>        | <b>8</b>    | <b>20.00%</b>  |
| Application of Derivatives            | 3               | 4           | 10.00%         |
| Functions                             | 1               | 1           | 2.50%          |
| Limit, Continuity & Differentiability | 2               | 3           | 7.50%          |
| <b>Integral Calculus</b>              | <b>5</b>        | <b>7</b>    | <b>17.50%</b>  |
| Definite integration                  | 5               | 7           | 17.50%         |
| <b>Matrix &amp; Determinants</b>      | <b>1</b>        | <b>2</b>    | <b>5.00%</b>   |
| Matrices & Determinants               | 1               | 2           | 5.00%          |
| <b>Probability</b>                    | <b>4</b>        | <b>6</b>    | <b>15.00%</b>  |
| Hyperbola                             | 1               | 2           | 5.00%          |
| Probability                           | 3               | 4           | 10.00%         |
| <b>Quadratic Equation</b>             | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Quadratic Equation                    | 1               | 1           | 2.50%          |
| <b>Sequence &amp; Series</b>          | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Sequence & Series                     | 1               | 1           | 2.50%          |
| <b>Trigonometry</b>                   | <b>3</b>        | <b>3</b>    | <b>7.50%</b>   |
| Solution of Triangle                  | 2               | 2           | 5.00%          |
| Trigonometric equation                | 1               | 1           | 2.50%          |

## BIOLOGY ANALYSIS

### Topic wise Allocation of Marks

| Topic/Subtopic                | No of Questions | Total Marks | % Weightage    |
|-------------------------------|-----------------|-------------|----------------|
| <b>Overall Breakup</b>        | <b>30</b>       | <b>40</b>   | <b>100.00%</b> |
| <b>Biomolecule</b>            | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Protein                       | 1               | 1           | 2.50%          |
| <b>Biomolecules</b>           | <b>6</b>        | <b>7</b>    | <b>17.50%</b>  |
| DNA                           | 2               | 3           | 7.50%          |
| Enzymes                       | 1               | 1           | 2.50%          |
| Lipids                        | 1               | 1           | 2.50%          |
| Protein                       | 2               | 2           | 5.00%          |
| <b>Biotechnological Tools</b> | <b>1</b>        | <b>2</b>    | <b>5.00%</b>   |
| Gel Electrophoresis           | 1               | 2           | 5.00%          |
| <b>Biotechnology</b>          | <b>2</b>        | <b>3</b>    | <b>7.50%</b>   |
| Plasmid                       | 1               | 1           | 2.50%          |
| Restriction Enzymes           | 1               | 2           | 5.00%          |
| <b>Cell Biology</b>           | <b>2</b>        | <b>3</b>    | <b>7.50%</b>   |
| Cell Division                 | 1               | 1           | 2.50%          |
| Mitochondria                  | 1               | 2           | 5.00%          |
| <b>Genetics</b>               | <b>1</b>        | <b>2</b>    | <b>5.00%</b>   |
| Mutation                      | 1               | 2           | 5.00%          |
| <b>Human Disease</b>          | <b>2</b>        | <b>3</b>    | <b>7.50%</b>   |
| Cancer                        | 2               | 3           | 7.50%          |
| <b>Human Immune System</b>    | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Antibodies & Immune System    | 1               | 1           | 2.50%          |
| Immune System                 | 1               | 1           | 2.50%          |
| <b>Human Nervous System</b>   | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Nervous System                | 1               | 1           | 2.50%          |
| <b>Human Padigree</b>         | <b>1</b>        | <b>2</b>    | <b>5.00%</b>   |
| Pedigree                      | 1               | 2           | 5.00%          |
| <b>Human Reproduction</b>     | <b>1</b>        | <b>1</b>    | <b>2.50%</b>   |
| Male Reproductive System      | 1               | 1           | 2.50%          |
| <b>Human Respiration</b>      | <b>1</b>        | <b>2</b>    | <b>5.00%</b>   |
| Respiratory System            | 1               | 2           | 5.00%          |
| <b>Mendelian Genetics</b>     | <b>2</b>        | <b>2</b>    | <b>5.00%</b>   |
| Genes                         | 1               | 1           | 2.50%          |
| Mutation                      | 1               | 1           | 2.50%          |

|                             |          |          |               |
|-----------------------------|----------|----------|---------------|
| <b>Molecular Genetics</b>   | <b>6</b> | <b>7</b> | <b>17.50%</b> |
| DNA                         | 1        | 1        | 2.50%         |
| DNA (Nucleic Acid)          | 1        | 2        | 5.00%         |
| gene Expression             | 1        | 1        | 2.50%         |
| Genetic Codons              | 1        | 1        | 2.50%         |
| Nucleic Acid                | 1        | 1        | 2.50%         |
| Transcription & Translation | 1        | 1        | 2.50%         |
| <b>Monera</b>               | <b>1</b> | <b>2</b> | <b>5.00%</b>  |
| Bacteria                    | 1        | 2        | 5.00%         |

### EXPECTED CUTOFF

| Stream                     | Cut Off | Total Marks |
|----------------------------|---------|-------------|
| <b>Stream SA (general)</b> | 43      | 100         |
| <b>SA- SC/ST</b>           | 32      | 100         |
| <b>SA- PWD</b>             | 32      | 100         |
| <b>Stream SB (general)</b> | 50      | 100         |
| <b>SB- SC/ST</b>           | 34      | 100         |
| <b>SB- PWD</b>             | 34      | 100         |
| <b>Stream SX (general)</b> | 54      | 100         |
| <b>SX- SC/ST</b>           | 40      | 100         |
| <b>SX- PWD</b>             | 40      | 100         |

Overall, it is felt that while paper is moderately difficulty, the cut-off may remain same as previous year.