SOF
SCIENCE OLYMPIAD FOUNDATION

Sample Paper
SYLLABUS 2015-16

CLASS
9

N C O
SOF NATIONAL CYBER OLYMPIAD

Total Questions : 50   Time : 1 hr.

PATTERN & MARKING SCHEME			
Section	(1) Logical Reasoning	(2) Computers & IT	(3) Achievers Section
No. of Questions	10	35	5
Marks per Ques.	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : Algorithms and Flowcharts in Programming, Visual Basic, Animations, HTML(Links, Anchors and Table tags), MS-Word, MS-Excel(Formula Auditing, Data Tools, Protecting and Sharing workbooks/worksheets, Working with cell range), MS-PowerPoint, Hardware, Software, Input & Output Devices, Memory & Storage Devices, Flash CS6, Communication Technology (Networking, Internet and Multimedia),Operating Systems(Types-Interactive (GUI based), Real Time and Distributed, Commonly used OS), Windows, Latest Developments in the field of IT.

Section – 3 : Higher Order Thinking Questions - Syllabus as per Section – 2.

Questions are based on Windows 7 and MS-Office 2010.

N S O
SOF NATIONAL SCIENCE OLYMPIAD

Total Questions : 50   Time : 1 hr.

PATTERN & MARKING SCHEME			
Section	(1) Logical Reasoning	(2) Science	(3) Achievers Section
No. of Questions	10	35	5
Marks per Ques.	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : Motion, Force and Laws of Motion, Gravitation, Work and Energy, Sound, Matter in Our Surroundings, Is Matter Around Us Pure, Atoms and Molecules, Structure of Atom, Cell - The Fundamental Unit of Life, Tissues, Diversity in Living Organisms, Why Do We Fall iII, Natural Resources, Improvement in Food Resources.

Section – 3 : Higher Order Thinking Questions - Syllabus as per Section – 2.

I M O
SOF INTERNATIONAL MATHEMATICS OLYMPIAD

Total Questions : 50   Time : 1 hr.

PATTERN & MARKING SCHEME				
Section	(1) Logical Reasoning	(2) Mathematical Reasoning	(3) Everyday Mathematics	(4) Achievers Section
No. of Questions	15	20	10	5
Marks per Ques.	1	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

Section – 2 : Number Systems, Polynomials, Coordinate Geometry, Linear Equations in Two Variables, Introduction to Euclid's Geometry, Lines and Angles, Triangles, Quadrilaterals, Areas of Parallelograms and Triangles, Circles, Constructions, Heron's Formula, Surface Areas and Volumes, Statistics, Probability.

Section – 3 : The syllabus of this section will be based on the syllabus of Mathematical Reasoning and Quantitative Aptitude.

Section – 4 : Higher Order Thinking Questions - Syllabus as per Section – 2.

I E O
SOF INTERNATIONAL ENGLISH OLYMPIAD
In association with ●● BRITISH ●● COUNCIL

Total Questions : 50   Time : 1 hr.

PATTERN & MARKING SCHEME				
Section	(1) Word and Structure Knowledge	(2) Reading	(3) Spoken and Written Expression	(4) Achievers Section
No. of Questions	45			5
Marks per Ques.	1	1	1	3

SYLLABUS

Section – 1 : Synonyms, Antonyms, Analogies and Spellings, One word, Word order, Nouns, Pronouns, Verbs, Adverbs, Adjectives, Articles, Prepositions, Conjunctions, Punctuations, Jumbled words, Voices, Concord, Question forms, Tenses, Conditionals, Modals, Reported speech. Collocations, Phrasal verbs, Idioms, Homonyms and homophones, Words related to social cause, Travel, Workplace, etc.

Section – 2 : Search for and retrieve information from various text types like flyers, Classifieds, Dictionaries, etc., Understand information presented in instruction manual format, Message format and others. Acquire broad understanding of and look for specific information in longer texts like editorials, Essays, etc.

Section – 3 : Ability to understand situation-based variations in functions like Giving advice, Stating preferences, Discussing probability, Making an offer, etc.

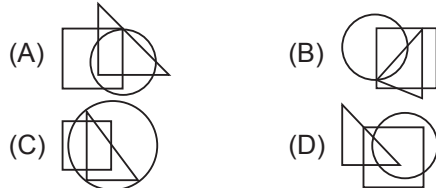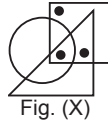**Section – 4 :** Higher Order Thinking Questions - Syllabus as per Sections 1, 2 and 3.

LOGICAL REASONING

1. Select a figure from the options which does not satisfies the same conditions of placement of the dots as in fig. (X).

Fig. (X)

(A) (B)

(C) (D)

2. Study the set of numbers given below and answer the following question.

427   581   839   275   589

Which of the following numbers will be obtained if the second digit of the greatest number is subtracted from the second digit of the lowest number after adding five to each of the numbers?
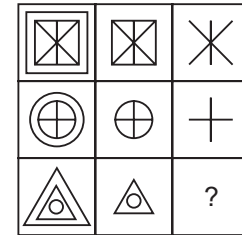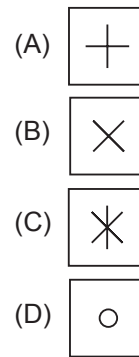
(A) 1   (B) 2
(C) 3   (D) 4

3. 'MILD' is related to 'NKOH in the same way as 'GATE' is related to _____.

(A) HCWI   (B) HCWT
(C) HWCT   (D) EYRC

4. If 'P + Q' means P is the brother of Q; 'P – Q' means P is the mother of Q; 'P × Q' means P is the sister of Q, then which of the following means 'M is the maternal uncle of R' ?
(A) M – R + K   (B) M + K – R
(C) M + K + Q   (D) M – K – R

5. Select a figure from the options which completes the Figure matrix.

(A)

(B)

(C)

(D)

COMPUTERS AND INFORMATION TECHNOLOGY

6. A technique used to redirect a legitimate website's traffic to another illegitimate website in order to gain access to a user's personal information is known as _____.
(A) Phishing   (B) Pharming
(C) Spamming   (D) Clickjacking

7. Which of the following animation techniques involves the use of live humans as stop motion characters?
(A) Pixilation   (B) Model animation
(C) Go animation   (D) Model animation

8. In Visual Basic, Hour() function returns ____.
(A) An Integer specifying a whole number
(B) A whole number between 0 and 23
(C) The hour of the day
(D) All of these

9. What does a disc defragmenter do?
(A) It is a utility program that facilitates compression of files so that they occupy less storage space.
(B) It is a utility program that minimizes the time taken by the hard disk optical reader to read up 'split' files. It does so by rearranging the files and free space on your computer so that files are stored in contiguous memory.
(C) It is a utility program that facilitates the backing up of the disk.
(D) It is a utility program used for creating and editing text file.

10. What does OCR stand for?
(A) Optical Character Render
(B) Optical Character Recognition
(C) Operational Character Reader
(D) Only Character Reader

11. Match the following.
1. Scanner   A. Input Device
2. OCR   B. Output Device
3. Light pen
4. Plotter
5. Printer
(A) 1A, 2B, 3A, 4B, 5A
(B) 1A, 2A, 3A, 4B, 5B
(C) 1A, 2A, 3B, 4B, 5B
(D) 1A, 2B, 3A, 4B, 5B

12. What are the two important categories of resident virus?
(A) Fast infectors, slow infectors
(B) Macro infectors, micro infectors
(C) Primary infectors, secondary infectors
(D) Attachment infectors, e-mail infectors

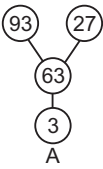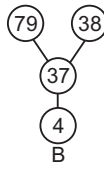**13.** Which of the following symbols will be used to end the flowchart?
(A) [parallelogram symbol]
(B) [rectangle symbol]
(C) [ellipse symbol]
(D) [diamond symbol]

14. What would be the output of the given HTML code?

```
<html>
<body>
<ol>
    <li> Sequence </li>
    <li type = "i"> Selection </li>
    <li> Decision </li>
</ol>
</body>
</html>
```

(A) I. Sequence
ii. Selection
iii. Decision

(B) 1. Sequence
ii. Selection
iii. Decision

(C) 1. Sequence
ii. Selection
3. Decision

(D) 1. Sequence
i. Selection
ii. Decision

15. Which of the following codes will add two numbers and display the sum in TextBox1 in Visual Basic? (Assume that the Name property of the TextBox is Text1)

(A)
```
Private Sub Command1_Click ( )
Dim Num1, Num2, Result As Int
Num 1 = 5;
Num 2 = 8;
Result = Num1 + Num2;
Text1.Val = Result;
End Sub
```

(B)
```
Private Sub Command1_Click ( )
Dim Num1, Num2, Result As Integer
Num1 = 5
Num2 = 8
Result = Num1 + Num2
Text1.Text = Result
End Sub
```

(C)
```
Private Sub Command1_Click ( )
Dim Num 1, Num 2, Result as Integer
Result = Num 1 + Num 2
Text1.Val = Result
End Sub
```

(D)
```
Private Sub Command1_Click ( )
Dim Num1, Num2, Result As Int
Num1 = 5;
Num2 = 8;
Result = Num1 + Num2;
Val (Text 1. Text) = Result
End Sub
```
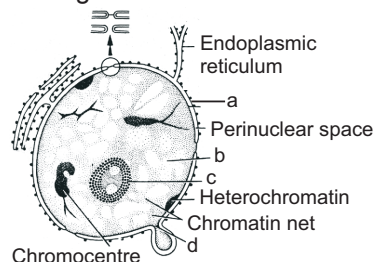
N S O National Science Olympiad

LOGICAL REASONING

1. A number series is given with one term missing. Choose the correct option that will continue the same pattern.

(2, 3), (3, 5), (5, 7), (7, 11), (11, 13), (....)
(A) (13, 15)   (B) (15, 16)
(C) (13, 17)   (D) (13, 26)

2. In a certain code, EXPLAINING is written as PXEALNIGNI. How is PRODUCTION written in that code?
(A) ORPUDTINOC   (B) ROPUDTIONC
(C) ORPUDTCNOI   (D) ORPUDTCNIO

3. A set of figures carrying certain characters, is given. Assuming that the characters in each set follow a similar pattern, find the missing character.

(93) (27)   (79) (38)   (67) (16)
   (63)   (37)   (42)
    (3)   (4)   (?)
     A   B   C

(A) 5   (B) 6
(C) 8   (D) 9

4. Which of the following options shows the correct mirror of the given combination of letters and numbers, if the mirror is placed vertically to the left?

A 2 N 6 Z 8 W 9

(A) ୧ W 8 Z ੭ N 2 A (B) ୧ W 8 Z ੭ N 2 A
(C) ୧ W 8 Z 9 N 2 A (D) ୧ W 8 Z ੭ N 2 A

5. In the following series, how many 5's are there which are immediately preceded by 9 and followed by 6?

9 6 9 5 8 4 3 2 9 5 6 2 3 5 9 8 7 6 5 9 4 5 6 1

(A) 0 (B) 1
(C) 2 (D) 3

SCIENCE

6. Some statements about the Rutherford's α-particle scattering experiment are given :

I. As most of the α-particles passed through the gold foil without getting deflected, the positive charge of the atom occupies the entire space.

II. As very few particles were deflected from their path, very little space inside the atom is empty.

III. As a very small fraction of α-particles were deflected by 180°, all the positive charge and mass of the gold atom were concentrated in a very small volume within the atom.

Select the correct statement(s).
(A) I and II (B) I and III
(C) II and III (D) III only

7. A metal sphere of mass 12 kg has the same diameter as another sphere of mass 4 kg. Both spheres are dropped simultaneously from a tower. When they are 8 m above the ground, they have the same _____.

(Neglect air resistance.)
(A) Kinetic energy (B) Potential energy
(C) Momentum (D) Acceleration

8. Read the given statements and mark the correct option.

Statement 1 : Echo is produced only when sound is incident on hard and polished surface.

Statement 2 : Sound energy can be totally reflected by objects with soft and loose texture.

(A) Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.

(B) Both statement 1 and statement 2 are true and statement 2 is not the correct explanation of statement 2.

(C) Statement 1 is true but statement 2 is false

(D) Both statement 1 and statement 2 are false

9. What happens to the inertia of an object when its velocity is doubled ?
(A) The object's inertia becomes times greater
(B) The object's inertia becomes 2 times greater
(C) The object's inertia becomes 4 times greater
(D) The object's inertia remains the same.

10. Filtration as a method of separation can be used for mixtures that are
(A) homogeneous and liquid-in-gas mixtures
(B) heterogeneous and liquid-in-liquid mixtures
(C) homogeneous and solid-in-liquid mixtures
(D) heterogeneous and solid-in-liquid mixtures.

11. The freezing and boiling points of a substance 'P' are –220°C and –185°C respectively.

At which of the following range of temperatures will 'P' exist as a liquid?
(A) Between –175°C and –210°C
(B) Between –190°C and –225°C
(C) Between –200°C and –160°C
(D) Between –195°C and –215°C

12. Taxon Y includes non-vascular plants whose plant body is not differentiated into true roots, stems and leaves and they have unicellular and non jacketed sex organs. These are chlorophyllous plants which are autotrophic in their mode of nutrition and may be of green, yellow, orange and red colour etc.
In the above passage Y is _____.
(A) Bryophyta (B) Thallophyta
(C) Pteridophyta (D) Gymnosperms

13. Refer the figure and identify from the marked alphabets (a, b, c, d) which is responsible for the following functions.

Endoplasmic reticulum
a
Perinuclear space
b
c
Heterochromatin
Chromatin net
d
Chromocentre

(I)   Means of localization of the chromosomes within the cell
(II) Selective barrier, allowing certain substances in or out of the nucleus
(III) Means of sequestering many of the *m*RNA

processing activities from the cytosol and separating nuclear and cytoplasmic constituents

(A) a
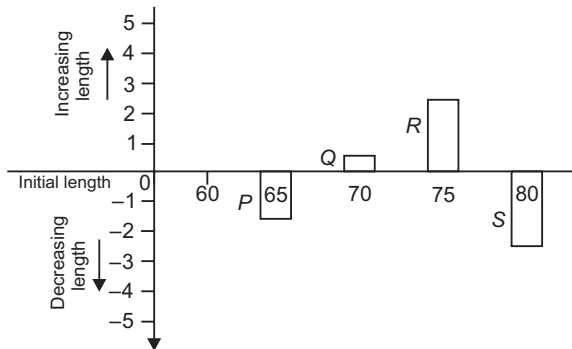(B) b
(C) c
(D) a and d

14. Fill in the blanks:

The __(i)__ of a sound is determined by its __(ii)__. The __(iii)__ of the sound wave depends upon the force with which an object is made to vibrate. A sound of __(iv)__ frequency is called a __(v)__.

	(i)	(ii)	(iii)	(iv)	(v)
(A)	Amplitude	Loudness	Loudness	Double	Note
(B)	Loudness	Amplitude	Amplitude	Single	Tone
(C)	Loudness	Amplitude	Amplitude	Double	Tone
(D)	Amplitude	Loudness	Loudness	Single	Note

15. Four strips of fresh potato *P*, *Q*, *R* and *S* were immersed in solutions of different concentrations. Osmosis occurred according to the concentration difference between cell sap and ambient solution. A graph was plotted between initial length of strips and the change in length after osmosis.
Which of these strips was placed in the most diluted solution?
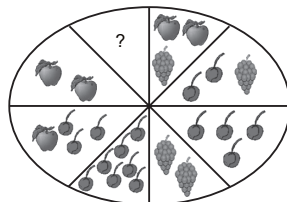
(A) *S*
(B) *Q*
(C) *R*
(D) *P*

I M O International Mathematics Olympiad

LOGICAL REASONING

1. Apples, cherries and grapes are arranged on a platter in the following fashion: opposite sectors contain fruit which is of equal value. To equal the value of two bunches of grapes, how much fruit must be placed in the empty sector?

(A)

(B)

(C)

(D)

2. If L denotes ÷, M denotes ×, P denotes + and Q denotes –, then which of the following statements is true?

(A) $32 \text{ P } 8 \text{ L } 16 \text{ Q } 4 = -\dfrac{3}{2}$

(B) $6 \text{ M } 18 \text{ Q } 26 \text{ L } 13 \text{ P } 7 = \dfrac{173}{13}$

(C) $11 \text{ M } 34 \text{ L } 17 \text{ Q } 8 \text{ L } 3 = \dfrac{38}{3}$

(D) $9 \text{ P } 9 \text{ L } 9 \text{ Q } 9 \text{ M } 9 = -71$

3. Find the missing number :

(A) 937
(B) 824
(C) 769
(D) 678

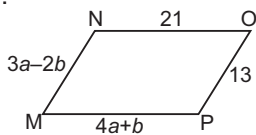**4.** Complete the pattern.

6, 11, 21, 36, 56, (...?...)

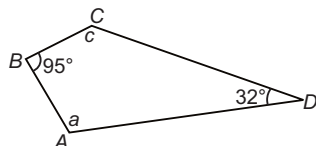(A) 42
(B) 51
(C) 81
(D) 91

5. What values of *a* and *b* make quadrilateral *MNOP* a parallelogram?

(A) *a* = 1, *b* = 5
(B) *a* = 5, *b* = 1
(C) $a = \frac{11}{7}$, $b = \frac{34}{7}$
(D) $a = \frac{34}{7}$, $b = \frac{11}{7}$

6. For the quadrilateral shown here, what is $\angle a + \angle c$?

(A) 53°
(B) 137°
(C) 180°
(D) 233°

7. Simplify : $\dfrac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}}$

(A) 1
(B) 6/11
(C) 0
(D) 1/2

8. Find the remainder when $p(y) = y^3 + y^2 + 2y + 3$ is divided $y + 2$.
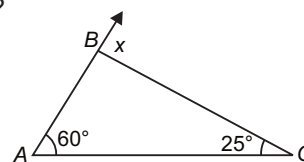
(A) 1
(B) 4
(C) –5
(D) 3

9. The ordinate of any point on *x*-axis is _____.

(A) 0
(B) 1
(C) –1
(D) any number

10. What is value of *x*?

(A) 35°
(B) 60°
(C) 85°
(D) 95°

11. A right circular cone has radius 5 cm and height 8 cm. What is the lateral surface area of the cone?
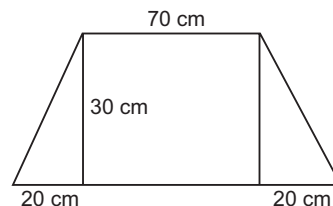
(A) 40π sq. cm
(B) 445π sq. cm
(C) $5\pi \sqrt{39}$ sq. cm
(D) $5\pi \sqrt{89}$ sq. cm

12. A rectangular kitchen table is three times as long as it is wide. If it was 3 m shorter and 3 m wider it would be a square. What are the dimensions of the rectangular table?

(A) 9 × 3
(B) 4 × 2
(C) 12 × 6
(D) 16 × 4

13. Two carpenters decided to design desks for students at the Junior High School. The dimensions of the desk are as shown. How much wood (in cm²) would they need for 30 desks?

(A) 2700 cm²
(B) 80000 cm²
(C) 21000 cm²
(D) 81000 cm²

14. Select the correct match.

Let $f(x) = \dfrac{(x-2)(x-4)}{x}$

Column I	Column II
(A) *f*(*x*) is a polynomial	As (*x* – 2), (*x* – 4), *x* are polynomials
(B) *f*(*x*) is an equation	As it can be written as $ax^2 + bx + c$
(C) *f*(*x*) is a rational number	As it is of the form $\frac{p}{q}$, $q \neq 0$
(D) *f*(*x*) is not a polynomial	As the exponents of *x* are not whole numbers.

15. The marks scored by some students for a question in the Science test are shown in the table below.

Marks	0	1	2	3	4	5
Number of students	3	2	3	5	x	1

(a) If the mode is 4, write down the smallest possible value of *x*.

(b) If the mean is $2\frac{1}{4}$, find the value of *x*.

	(a)	(b)
(A)	6	2
(B)	5	2
(C)	6	4
(D)	6	3

International English Olympiad

WORD AND STRUCTURE KNOWLEDGE

Direction (Q. No. 1 and 2) : Choose one suitable word/phrase for each blank.

1. I am happy you are helping me with the assignment. This kind of work is not really my _____.
   - (A) Cup and sauce
   - (B) Cup of tea
   - (C) Cup of coffee
   - (D) Tea cup

2. The discussion was by no means _____. It went on for more than four hours!
   - (A) Cut and dried
   - (B) Chopped and dried
   - (C) Cut and shredded
   - (D) Dried and cut

3. Choose the correct spelling of the word.
   - (A) Believe
   - (B) Beleive
   - (C) Believ
   - (D) Beleev

4. Choose the correct phrase.
   - (A) Down and up
   - (B) Down and out
   - (C) Down and town
   - (D) Out and down

Direction (Q. No. 5 and 6) : Fill in the blanks using the correct word.

5. A class full of very good students means _____ failures for the teachers to worry about.
   - (A) Lesser
   - (B) Less
   - (C) Fewer
   - (D) Less than

6. He seems to know a lot about you! How long have you _____him?
   - (A) Known
   - (B) Knew
   - (C) Been knowing
   - (D) Know

7. Spot the error in the sentence.
   <u>Becoming a monitor</u> / <u>often means</u> /
        (A)   (B)
   <u>to lose friends</u>.   <u>No error</u>
       (C)   (D)

Direction : Complete the conversation with the correct word.

8. Ravi: I think it's really exciting to go to new places.
   Teacher: What _____ keep in mind if you are going to a new place.
   - (A) Do you have to
   - (B) Can you
   - (C) Have you to
   - (D) Must you have to

Direction : Change the given direct sentence to indirect.

9. "Drive carefully!" Ram said to me.
   - (A) Ram said to me drive carefully.
   - (B) Ram ordered me drive carefully.
   - (C) Ram told me to drive carefully.
   - (D) None of the above.

READING

Direction (Q. No. 10 and 11) : Read the passage and answer the following questions.

The fly was finally hers. It had taken Mini hours to trap it, but now, exhausted, it buzzed and crashed hopelessly around inside a pickle jar. Kneeling on a chair, she took a chapatti and spread it with a thick layer of butter, wiping the knife clean against the edge of the dish, the way her mother used to and savored her victory. She was again in control.

10. The event of trapping the fly is compared with _____.
   - (A) The taste of chapati and butter
   - (B) A war followed by celebrations
   - (C) A celebration by the victor
   - (D) The defeat of the oppressed

11. Which of the following expressions would you use to describe Mini's emotions after trapping the fly?
   - (A) On cloud ten
   - (B) Under a cloud
   - (C) On cloud nine
   - (D) Every dark cloud has a silver lining

SPOKEN AND WRITTEN EXPRESSION

Direction (Q. No. 12 and 13) : Find one sentence to complete the dialogue.

12. Teacher to student : I thought you had been doing your homework regularly. Why are you still so irregular with your work?
(A) I will let your parents know that you have failed this year.
(B) I'm afraid, at this rate, I'll have to give you a 'D' grade.
(C) I'm expecting you to earn a 'D' grade.
(D) I think you will do well this year.

13. Manasa : Vinu, it's the Maths class now! I forgot my book.
(A) Could you share your book with me today.
(B) Look here! Give me that book of yours!
(C) Can I buy a Maths book?
(D) Could I borrow your Maths notebook, please!

ACHIEVERS SECTION

Direction (Q. No. 14 and 15) : Choose the best word.

14. Disaster management _____ that the areas are mapped beforehand.
(A) Is requires
(B) Requires
(C) Required
(D) Is required

15. "I am happy to inspire so many people, _____ women and mothers", said Mary Kom.
(A) And
(B) Special
(C) Especially
(D) Also

SPACE FOR ROUGH WORK