

N.D.A-II-2010

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**

T.B.C. : P-PFC-K-ICV

Test Booklet Series

Serial No.

123333

**TEST BOOKLET**  
**GENERAL ABILITY TEST**



**Time Allowed : Two Hours and Thirty Minutes**

**Maximum Marks : 600**

**INSTRUCTIONS**

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
4. This Test Booklet contains 150 items (questions) in two Parts : PART—A and PART—B. Each item in PART—B is printed both in Hindi and English. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers :**  
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
  - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** of the marks assigned to that question will be deducted as penalty.
  - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
  - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**

ध्यान दें : अनुदेशों का हिन्दी रूपान्तर इस पुस्तिका के पिछले पृष्ठ पर छपा है।

**PART-A**  
**COMPREHENSION**

**Directions (For the 12 items which follow) :**

In this section, you have 03 short passages. After each passage, you will find several questions based on the passage. First, read a passage and then answer the questions based on it. You are required to select your answers based on the contents of the passage and opinion of the author only.

**Examples 'I' and 'J' have been solved for you.**

**PASSAGE (EXAMPLE)**

In our approach to life, be it pragmatic or otherwise, a basic fact that confronts us squarely and unmistakably is the desire for peace, security and happiness. Different forms of life at different levels of existence make up the teeming denizens of this earth of ours. And, no matter whether they belong to the higher groups such as human beings or to the lower groups such as animals, all beings primarily seek peace, comfort and security. Life is as dear to a mute creature as it is to a man. Even the lowliest insect strives for protection against dangers that threaten its life. Just as each one of us wants to live and not to die, so do all other creatures.

- |  |   |
|--|---|
| <p>I. The author's main point is that</p> <ul style="list-style-type: none"><li>(a) different forms of life are found on the earth</li><li>(b) different levels of existence are possible in nature</li><li>(c) peace and security are the chief goals of all living beings</li><li>(d) even the weakest creature struggles to preserve its life</li></ul> | <p>J. Which one of the following assumptions or steps is essential in developing the author's position ?</p> <ul style="list-style-type: none"><li>(a) All forms of life have a single overriding goal</li><li>(b) The will to survive of a creature is identified with a desire for peace</li><li>(c) All beings are divided into higher and lower groups</li><li>(d) A parallel is drawn between happiness and life, and pain and death</li></ul> |
|--|---|

**Explanation :**

- I. The idea which represents the author's main point is "peace and security are the chief goals of all living beings", which is response (c). So (c) is the correct answer.
- J. The best assumption underlying the passage is "The will to survive of a creature is identified with a desire for peace", which is response (b). So (b) is the correct answer.

### PASSAGE-I

An old man with steel-rimmed spectacles and very dusty clothes sat by the side of the road. There was a pontoon bridge across the river and carts, trucks, and men, women and children were crossing it. The mule-drawn carts staggered up the steep bank from the bridge with soldiers helping to push against the spokes of the wheels. The trucks wound up and away heading out of it all. The peasants plodded along in the ankle-deep dust. But the old man sat there without moving.

1. The term "pontoon bridge" means :
  - (a) a temporary bridge constructed with the help of ropes
  - (b) a bridge made by soldiers during a war
  - (c) a bridge supported by floating flat-bottomed boats
  - (d) a bridge made with wooden planks
2. The soldiers were "helping to push against the spokes of the wheels" because :
  - (a) they wanted to stop the carts
  - (b) the spokes of the wheels were broken
  - (c) the mules refused to draw the carts
  - (d) there was a steep elevation
3. The mule-drawn carts staggered up because :
  - (a) there were too many mule-carts
  - (b) the mules were indisciplined
  - (c) it was a steep uphill journey
  - (d) the carts were blocked by the peasants
4. The reference to the old man in the beginning and the end of the passage indicates that :
  - (a) the writer wants to compare between the bridge and motionless old man
  - (b) the description that takes place between the first sentence and the last sentence is irrelevant
  - (c) there is an unnecessary repetition in the reference to the old man
  - (d) the figure of the old man is brought under a sharp focus

### PASSAGE-II

When vegetation sprouts in the desert, it is a good sign but when the ice in the Arctic and Antarctic begins to turn green, there is something terribly wrong. Reports say that an iceberg, approximately the size of New York city, has broken off from the icy continent. An Argentine team discovered huge cracks in the polar ice caps. These developments can have serious implications. If polar ice fields melt, our coastal cities might be submerged, and sea levels across the world could rise between 3.65 and 6.09 metre in different parts of the earth. This is probably due to global warming.

5. What can be considered as a "good sign" in the desert ?
  - (a) when shrubs and trees grow there
  - (b) when it snows in the desert
  - (c) when ice caps melt and there is water
  - (d) when there is vegetation found in the desert
6. The melting of ice fields in the Arctic and Antarctic regions is dangerous because :
  - (a) the ice will turn green and poisonous
  - (b) it will cause huge floods which will destroy coastal regions
  - (c) it will create global warming and will badly affect our climate
  - (d) huge cracks will develop all over the world

7. Polar ice caps develop huge cracks because :
- (a) of the movement of the earth
  - (b) of the breaking off of icebergs
  - (c) of the crowding of cities like New York
  - (d) of rising temperatures
8. What do you think the intention of the author is ?
- (a) to describe strange phenomena in nature
  - (b) to report findings of research teams working in the polar regions
  - (c) to make us aware of the dangers of global warming
  - (d) to compare developments in deserts and Arctic regions caused by global warming

### PASSAGE-III

It was a very cold evening and so few people were seen out on the streets. I did not go out myself although it was my habit not to keep indoors after sunset. So I closed all the doors and windows of my room, took the book which had been lying opened on the table, and tried to read it. The cold was getting so severe that I started shivering, so I wrapped myself up with a bigger blanket. But I could not continue reading the book because I was nearly rendered incapable of turning the pages.

9. The author's habit was to :
- (a) read in the evening
  - (b) sleep in the evening
  - (c) go out in the evening
  - (d) play in the evening
10. If it was not so cold the author would have :
- (a) liked to work
  - (b) liked to sit and look out to the streets
  - (c) liked to read
  - (d) liked to have a stroll
11. The author could not continue reading the book because :
- (a) he did not like to
  - (b) he was feeling tired
  - (c) he was feeling very cold
  - (d) the lights had gone off
12. There were not many people outside because :
- (a) it was a rainy evening
  - (b) it was a cold evening
  - (c) it was a dark evening
  - (d) there was heavy snow outside

## REARRANGING PARTS OF A SENTENCE

**Directions (For the 6 items which follow) :**

In the following items, some parts of the sentence have been jumbled up. You are required to rearrange these parts which are labelled P, Q, R and S to produce the correct sentence. Choose the proper sequence and mark in your Answer Sheet accordingly.

**Example 'Z' has been solved for you.**

Z. Some people believe that the effect is very bad on children of cinema  
P Q R S

*The correct sequence should be :*

- (a) P-S-R-Q
- (b) S-P-Q-R
- (c) S-R-P-Q
- (d) Q-S-R-P

*Explanation :*

The proper way of writing the sentence is "Some people believe that the effect of cinema on children is very bad". This is indicated by the sequence P-S-R-Q and so (a) is the correct answer.

13. At the door that he would have the door broken open the guard shouted  
P Q  
if the persons inside did not heed his call at the top of his voice  
R S

The correct sequence should be :

- (a) S-P-R-Q
- (b) Q-S-P-R
- (c) P-R-S-Q
- (d) P-Q-R-S

14. by bandits were driving through a desert area a man and his daughter  
P Q R  
when they were held up  
S

The correct sequence should be :

- (a) S-P-R-Q
- (b) R-Q-S-P
- (c) S-R-P-Q
- (d) P-Q-R-S

15. Our finest contemporary achievement and toil in the provision of higher education  
P Q  
is our unprecedented expenditure of wealth for all  
R S

The correct sequence should be :

- (a) P-Q-R-S  
(b) R-Q-P-S  
(c) R-P-Q-S  
(d) P-R-Q-S
16. It seemed to him like seeing one's reflection an endless quest  
P Q  
two mirrors while standing between  
R S
- The correct sequence should be :
- (a) P-R-S-Q  
(b) S-P-Q-R  
(c) R-S-P-Q  
(d) Q-P-S-R
17. A series of shocks is known as earthquake which can be recognised through seismic waves  
P Q  
that result from sudden earth movements or tremors  
R  
causing widespread destruction of life and property  
S

The correct sequence should be :

- (a) P-Q-R-S  
(b) R-P-Q-S  
(c) R-S-P-Q  
(d) R-Q-S-P
18. in this world a man has it is possible that the best friend may turn against him  
P Q R S
- The correct sequence should be :
- (a) Q-P-R-S  
(b) P-Q-R-S  
(c) R-Q-P-S  
(d) Q-R-S-P



27. Many a star      are      twinkling in the sky.      No error  
 (a)                    (b)                    (c)                    (d)
28. We discussed the problem      so thoroughly that      I found it easy to work it out.  
 (a)                    (b)                    (c)
- No error  
 (d)

**Directions (For the 06 items which follow) :**

Each of the following items consists of a sentence followed by four words. Select the **synonym** of the word (occurring in the sentence in capital letters) as per the context.

29. His descriptions are VIVID.  
 (a) Detailed  
 (b) Categorical  
 (c) Clear  
 (d) Ambiguous
30. Friends have always DEPLORED my unsociable nature.  
 (a) Deprived  
 (b) Implored  
 (c) Denied  
 (d) Regretted
31. Despite his enormous wealth, the businessman was very FRUGAL in his habits.  
 (a) Reckless  
 (b) Law-abiding  
 (c) Unpredictable  
 (d) Economical
32. He was ENGROSSED in writing a story.  
 (a) Absolved  
 (b) Absorbed  
 (c) Interested  
 (d) Engaged
33. People fear him because of his VINDICTIVE nature.  
 (a) Violent  
 (b) Cruel  
 (c) Revengeful  
 (d) Irritable
34. He always has a very PRAGMATIC approach to life.  
 (a) Practical  
 (b) Proficient  
 (c) Potent  
 (d) Patronizing

**Directions (For the 06 items which follow) :**

Each of the following items consists of a sentence followed by four words or group of words. Select the **antonym** of the word (occurring in the sentence in capital letters) as per the context.

35. What the critic said about this new book was ABSURD.  
 (a) Interesting  
 (b) Impartial  
 (c) Sensible  
 (d) Ridiculous
36. The issue raised in the forum can be IGNORED.  
 (a) Removed  
 (b) Considered  
 (c) Set aside  
 (d) Debated
37. After swallowing the frog had become LETHARGIC.  
 (a) Aggressive  
 (b) Dull  
 (c) Active  
 (d) Hungry
38. For the first time I saw him speaking RUDELY to her.  
 (a) Softly  
 (b) Gently  
 (c) Politely  
 (d) Slowly

39. Dust storms and polluted rivers have made it HAZARDOUS to breathe the air and drink the water.  
 (a) Convenient  
 (b) Risky  
 (c) Wrong  
 (d) Safe
40. Only hard work can ENRICH our country.  
 (a) Impoverish  
 (b) Improve  
 (c) Increase  
 (d) Involve

**Directions (For the 10 items which follow) :**

Each of the following items is followed by four words or group of words. Fill in the blanks with appropriate word or group of words.

41. Your present statement does not \_\_\_\_\_ what you said last week.  
 (a) accord to  
 (b) accord in  
 (c) accord with  
 (d) accord for
42. I had a vague \_\_\_\_\_ that the lady originally belonged to Scotland.  
 (a) notion  
 (b) expression  
 (c) imagination  
 (d) theory
43. The prisoner showed no \_\_\_\_\_ for his crimes.  
 (a) hatred  
 (b) obstinacy  
 (c) remorse  
 (d) anger
44. It is inconceivable that in many schools children are subjected to physical \_\_\_\_\_ in the name of discipline.  
 (a) violation  
 (b) exercise  
 (c) violence  
 (d) security
45. We have not yet fully realised the \_\_\_\_\_ consequences of the war.  
 (a) happy  
 (b) pleasing  
 (c) grim  
 (d) exciting
46. Happiness consists in being \_\_\_\_\_ what we have.  
 (a) contented to  
 (b) contented with  
 (c) contented for  
 (d) contented in
47. His rude behaviour is a \_\_\_\_\_ his organization.  
 (a) disgrace for  
 (b) disgrace on  
 (c) disgrace upon  
 (d) disgrace to
48. No child is \_\_\_\_\_ understanding. One has to wait and provide proper guidance.  
 (a) dull to  
 (b) dull in  
 (c) dull of  
 (d) dull for
49. I am fully \_\_\_\_\_ the problems facing the industry.  
 (a) alive with  
 (b) alive to  
 (c) alive for  
 (d) alive on
50. The Romans were \_\_\_\_\_ science.  
 (a) bad in  
 (b) bad to  
 (c) bad for  
 (d) bad at

PART—B

51. Which among the following statements about Nirupam Sen is/are correct ?

1. In the year 2009 he was appointed as Special Senior Adviser to the President of the UN General Assembly on the world financial and economic crisis
2. He was formerly the Indian Ambassador to the UK

Select the correct answer using the code given below :

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

52. Consider the following statement :

*I can only thank a genius director like Guru Dutt for giving me an opportunity to work in his films and translate his conceptions on screen. I was able to involve (myself) in many innovative experiments he had tried. The best example is the making of 'Kagaz Ke Phool' (1959), which is the first cinemascope venture in the Indian film industry.*

On receipt of a prestigious award of India the above statement was made recently by :

- (a) Santhosh Sivan
- (b) Ravi K. Chandran
- (c) Ramachandra Babu
- (d) V. K. Murthy

53. Consider the following statements about General V. K. Singh :

1. He is the first trained commando to take over as the Chief of the Army Staff of Indian Army
2. He belongs to the Rajputana Rifles regiment of Indian Army
3. General Singh succeeded General Deepak Kapoor

Which among the statements given above is/are correct ?

- (a) 1, 2 and 3
- (b) 1 and 3 only
- (c) 3 only
- (d) 1 and 2 only

54. Consider the following passage and identify the form of dance theatre referred thereto using the code given below :

*This is a uniquely traditional form of dance theatre of India with a formidable classical background. The main essence of this form of dance drama is its attachment with religion, which provides the most common theme for its plays. The performance begins with a prayer offering to the lord Ganesh, which is followed by a comedy act, accompanied by the background music of the chenda and the maddale, and a tala (cymbals) played by a team of three. The narrator, who is also a part of the team is called Bhagavata, and is the producer, the director, and the head of the ceremony. His primary task involves the narration of the story through songs, introduction of the characters, and occasionally conversing with them. Another unique feature of it is the totally unrehearsed and unwritten use of dialogues, which makes it so special.*

Code :

- (a) Cheraw
- (b) Yakshagana
- (c) Devarattam
- (d) Jatra

55. In a rare case, a record number of about 20000 employees of the Government of Kerala retired on a single day (on 31 March 2010). Which among the following statements is/are correct in this respect ?

1. The mass retirement follows the Kerala government's move to allow employees retiring any day during the year to work till March 31
2. In a recent bid to reduce burden on the state exchequer, the Government of Kerala reduced the retirement age of government employees from 59 to 58 years
3. More than 50% of those retired were from the Education department

Select the correct answer using the code given below :

- (a) 1, 2 and 3
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1 only

56. Car manufacturer Maruti has stopped selling its popular brand Maruti 800 in some major cities of India from 1<sup>st</sup> of April 2010. Which among the following statements is/are correct in this regard ?

1. The engine of the car is unable to meet the stricter Bharat Stage IV norms that become mandatory in some major cities of India from that date
2. The company has decided to promote another brand of car in the small car segment in some select cities
3. The company wants to shorten its product line

Select the correct answer using the code given below :

- (a) 1, 2 and 3
- (b) 1 only
- (c) 2 and 3 only
- (d) 2 only

57. In a major eco-friendly step towards renewable energy generation in India, in June 2010 seaweed sourced ethanol (ethyl alcohol), a biofuel additive in transport fuel, has been used to run a car for the first time. With regard to this which of the following statements is/are correct ?

1. Experiment in this direction was carried out by the scientists of Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar
2. India has become the first country in the world to produce and use green fuel to run cars

Select the correct answer using the code given below :

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

58. Which of the following aspects with regard to the T-20 world cup (Men's) cricket and T-20 world cup (Women's) cricket tournaments held in the year 2010 was/were common ?

1. Both the tournaments were won by England
2. The tournaments were held in West Indies
3. There was a tie match each in both the tournaments

Select the correct answer using the code given below :

- (a) 1 only
- (b) 2 only
- (c) 1, 2 and 3
- (d) 2 and 3 only

59. Which amongst the following statements is/are correct about the *INS Arihant* ?

1. It is India's first nuclear submarine
  2. It is India's first aircraft carrier
  3. It has been indigenously built in India
- (a) 1 only
  - (b) 2 and 3 only
  - (c) 1 and 3 only
  - (d) 2 only

60. Which among the following statements about the Zaranj-Delaram road is/are correct ?

1. It was constructed by Border Road Organization in Afghanistan
2. It links India with Afghanistan via Pakistan
3. This road will open up market for Indian goods in Afghanistan via Iran

Select the correct answer using the code given below :

- (a) 3 only
- (b) 1 and 3
- (c) 1 and 2
- (d) 2 only

The next *four (04)* items are based on the following Table :

Match List I with List II, List III and List IV and select the correct answer using the code given below :

<i>List I</i> (Body system)	<i>List II</i> (Organ)	<i>List III</i> (Structure)	<i>List IV</i> (Function of the system)
A. Blood Circulation	1. Bone marrow	I. Alveoli	i. Clot formation
B. Excretory	2. Thymus	II. T-lymphocyte	ii. Perfusion of tissues
C. Alimentary	3. Intestine	III. Myocardium	iii. Support and protect of body frame
D. Skeletal	4. Lung	IV. Matrix	iv. Oxygenation
E. Blood	5. Bone	V. Nephron	v. Filtration of body waste
F. Respiratory	6. Heart	VI. Villi	vi. Absorption of nutrients
G. Neurological	7. Kidney	VII. Axon	vii. Fighting infection and foreign invasion
H. Immunological	8. Neuron	VIII. Platelets	viii. Transmission of electrical impulse

61.      List I   List II   List III   List IV
- (a)    A        1        III      ii
- (b)    B        7        VI      v
- (c)    A        6        III      ii
- (d)    B        2        V        v

63.      List I   List II   List III   List IV
- (a)    E        1        I        i
- (b)    F        2        I        iv
- (c)    E        1        IV      v
- (d)    F        4        I        iv

62.      List I   List II   List III   List IV
- (a)    C        3        VI      vi
- (b)    D        1        V        iii
- (c)    C        2        VII     vi
- (d)    D        5        IV      vii

64.      List I   List II   List III   List IV
- (a)    G        8        VII     viii
- (b)    H        2        II      iv
- (c)    G        8        VI      vii
- (d)    H        1        II      vii

65. Consider the following statements regarding the recent global outbreak of 'Swine Flu' :

1. The agent of infection is not well identified
2. The risk is higher in those who consume pork
3. It has a propensity to spread from contact with an infected person
4. Absence of an effective treatment or vaccine makes it risk for a global pandemic

Which of the statements given above is/ are correct ?

- (a) 1, 2 and 4
- (b) 3 and 4
- (c) 2 and 3
- (d) 3 only

66. When dried raisins are put in plain water, they swell up. If put again in brine solution, they shrivel up. This phenomenon indicates the property of :

- (a) Diffusion
- (b) Perfusion
- (c) Osmosis
- (d) Fusion

67. Consider the following items

1. Proteins, Carbohydrates, and Fats
2. Vitamins
3. Minerals
4. Water

Which of the above are considered as the constituents of food ?

- (a) 1, 2 and 4 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2, 3 and 4

**Directions :**

The next **four (04)** items consist of two statements, statement I and statement II. You are to examine these two statements carefully and select the answers to these items using the code given below :

**Code :**

- (a) Both the statements are individually true and statement II is the correct explanation of statement I
- (b) Both the statements are individually true but statement II is **not** the correct explanation of statement I
- (c) Statement I is true but statement II is false
- (d) Statement I is false but statement II is true

68. Statement I : Autotroph plants contain the pigment chlorophyll for meeting their requirement of carbon and energy

Statement II : Photosynthesis is the process of converting water into food using sunlight and oxygen

69. Statement I : Reproduction is the process by which living organisms produce young ones of their species. There are different forms of reproduction

Statement II : Sex organs, male and female, are mandatory for reproduction

70. Statement I : Human beings have 23 pair of chromosomes, one of which is the sex chromosome and the remaining 22 autosomes. The X-linked diseases are related to mutations on a sex chromosome.

Statement II : Colour blindness results from a mutation in X chromosome

71. Statement I : Sarkaria Commission recommended that Governor of a state should be a non-political person appointed after consultation with the Chief Minister of the state

Statement II : This could be achieved through amending Article 165 of the Constitution of India

72. The Legislative Council in a state in India can be created or abolished by the :

- (a) Parliament on the recommendation of a Governor of the state.
- (b) Parliament alone.
- (c) Parliament after the state assembly passes the resolution to that effect.
- (d) Governor of the state on the recommendation of the Council of Ministers.

73. The Government Bill means a bill introduced by a :

- (a) Member of the Treasury bench in the Lok Sabha
- (b) Member of the Parliament who is not a Minister
- (c) Minister in the Lok Sabha
- (d) Minister in any House of the Parliament.

The next **four (04)** items are based on the Table given below :

Match List I with List II, List III and List IV and select the correct answer using the code given below :

<i>List I (Ruler)</i>	<i>List II (Important Battle)</i>	<i>List III (Dynasty)</i>	<i>List IV (Significant work)</i>
A. Ashoka	1. Against several rulers of Northern and Southern India	I. Kushana	i. Writer and poet, patron of learning besides an empire builder
B. Samudragupta	2. Kalinga war	II. Maurya	ii. Political conquest, patron of learning
C. Kanishka	3. Battle of Pundravardhana	III. Pushpavati	iii. Holding the 4th Buddhist Council and patron of learning
D. Harshavardhana	4. Against the Chinese and the Parthians	IV. Gupta	iv. Spread of Dharma, ahimsa and welfare activities

- 74.
- |     | List I | List II | List III | List IV |
|-----|--------|---------|----------|---------|
| (a) | A      | 1       | II       | iv      |
| (b) | A      | 2       | II       | iv      |
| (c) | B      | 1       | IV       | iii     |
| (d) | B      | 2       | IV       | iii     |

- 76.
- |     | List I | List II | List III | List IV |
|-----|--------|---------|----------|---------|
| (a) | B      | 1       | III      | i       |
| (b) | C      | 4       | IV       | ii      |
| (c) | B      | 1       | IV       | ii      |
| (d) | C      | 4       | III      | i       |

- 75.
- |     | List I | List II | List III | List IV |
|-----|--------|---------|----------|---------|
| (a) | C      | 4       | I        | iii     |
| (b) | D      | 3       | III      | i       |
| (c) | C      | 4       | I        | i       |
| (d) | D      | 3       | III      | ii      |

- 77.
- |     | List I | List II | List III | List IV |
|-----|--------|---------|----------|---------|
| (a) | A      | 1       | II       | iii     |
| (b) | D      | 3       | III      | ii      |
| (c) | A      | 1       | II       | iii     |
| (d) | D      | 3       | III      | i       |

78. Right to Information in India is a :
- Fundamental Right
  - Legal Right
  - Both Fundamental and Legal Rights
  - Neither Fundamental nor Legal Right

79. Which among the following statements are correct with regard to the Portuguese in India ?

- They had the monopoly over the Eastern trade in the 16<sup>th</sup> Century
- They possessed Bombay in the beginning
- They had trading settlements at Cochin, Diu and Daman
- The Mughals denied them any trading concessions

Select the correct answer using the code given below :

- 1, 2 and 3
- 2, 3 and 4
- 1, 2 and 4
- 1 and 3 only

80. Which among the following statements with respect to the Comptroller and Auditor General of India is/are correct ?

- The procedure and grounds for his removal from the office are the same as of a Judge of Supreme Court
- He prescribes the form in which accounts of the Union and the States are to be kept

Select the correct answer using the code given below :

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

81. Consider the following statements relating to Gandhian strategy of Satyagraha :

- Under the Gandhian strategy, which may be described as Struggle-Truce-Struggle (S-T-S), phases of a vigorous extra-legal mass movement and confrontation with colonial authority alternate with phases, during which direct confrontation is withdrawn
- The entire political process of S-T-S was an upward spiraling one, which also assumed that the freedom struggle would pass through several stages, ending with the transfer of power by the colonial regime itself

Which of the statements given above is/are correct ?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

82. Rajmohan Gandhi's book 'A Tale of Two Revolts' (2009) deals with the :

- Taiping and Indigo revolts
- Revolt of 1857 and the American Civil War
- Revolt of 1857 and the Deccan Uprising
- American Civil War and Santhal Uprising

83. Consider the following statements relating to Jawaharlal Nehru's attitude towards science and technology :

- Nehru was convinced that science and technology were crucial to the solution of India's problems relating to underdevelopment and poverty
- To emphasize the importance of science and scientific research, Nehru himself became the Chairman of the Council of Scientific and Industrial Research

Which of the statements given above is/are correct ?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

84. "No Taxation without Representation" was the popular slogan of :

- (a) Indian freedom struggle
- (b) American war of independence
- (c) Russian revolution
- (d) French revolution

85. Which one of the following pairs is *not* correctly matched ?

- (a) Power of Parliament : Creating a new State
- (b) Power of State Legislature : Altering the name of a State
- (c) Equality before the law : Both Indian and non-Indian citizens
- (d) Equality of opportunity : Indian citizen

86. Which among the following statements with regard to Raja Rammohan Roy are correct ?

- 1. He started the Atmiya Sabha
- 2. He wrote the Gift of Monotheist
- 3. He published the Precepts of Jesus
- 4. He founded the Brahma Sabha

Select the correct answer using the code given below :

- (a) 2, 3 and 4 only
- (b) 1, 2 and 3 only
- (c) 1, 3 and 4 only
- (d) 1, 2, 3 and 4

87. Which one among the following was *not* a demand of the early congress (1885-1905) ?

- (a) Indianization of the superior grades of the administrative services
- (b) Purna Swaraj/complete independence
- (c) Abolition of the Arms Act
- (d) Autonomy within the empire

The next **three (03)** items are based on the passage given below :

The myth is that the Indian National Congress was started by A.O. Hume and others under the official direction, guidance and advice of no less a person than Lord Dufferin, the Viceroy, to provide a safe, mild, peaceful and constitutional outlet or safety-valve for the rising discontent among the masses, which was inevitably leading towards a popular and violent revolution. Consequently, the revolutionary potential was nipped in the bud. Most writers accept the core of the myth, that a violent revolution was on the cards at the time and was avoided only by the foundations of the congress,..... All of them agree that the manner of its birth affected the basic character and future work of the congress in a crucial manner.

88. The colonial rulers, according to the safety valve thesis, were trying to use congress as :

- (a) a constitutional outlet for the mass discontent against the authorities
- (b) an instrument for the spread of British culture in India
- (c) an instrument to expand the Indian market for the products of British industries
- (d) an agency for social change in India

89. The author describes the safety-valve thesis as a myth because :

- (a) evidence are insufficient to establish the validity of the thesis.
- (b) the author has concluded that in the light of available materials the thesis does not hold ground.
- (c) the congress was a nationalist organization right from the start.
- (d) the violent anti-colonial movements did not come to an end with the foundation of the congress.

90. The core of the safety-valve thesis rests on the assumption that :

- (a) a violent anti-colonial revolution was bound to occur unless a constitutional platform like the congress was founded.
- (b) the congress would assist the British in administering the colony.
- (c) the congress leaders would constitute the colonial elite.
- (d) the congress as a party would assist the colonial rulers to implement political and social reforms.

91. Match List I with List II and select the correct answer using the code given below the lists :

<i>List I</i>	<i>List II</i>
<i>(Grassland)</i>	<i>(Country)</i>
A. Pampas	1. Venezuela
B. Veld	2. Australia
C. Downs	3. South Africa
D. Llanos	4. Argentina

**Code :**

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 3 | 2 | 1 |
| (b) | 4 | 2 | 3 | 1 |
| (c) | 1 | 3 | 2 | 4 |
| (d) | 1 | 2 | 3 | 4 |

92. Consider the following statements :

- 1. In India, the largest concentration of roads is found in the northern plains
- 2. The ratio of surfaced road to the total road length is lower in the northern plains

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

93. Which one of the following does *not* characterize the Himalayas ?

- (a) Various parallel ranges of the Himalayas form a convex arc
- (b) There exist syntaxial bends at both the terminals of the Himalayas
- (c) Indus, Sutlej and Brahmaputra rivers are examples of antecedent drainage
- (d) The Himalayas are wider in the east than in the west

94. Which among the following statements provides the best evidence that a river is flowing through a rift valley ?

- (a) The Chambal valley is marked by bad land topography
- (b) River Tapi does not have Delta but Estuary only
- (c) River Mahanadi flows through a gorge at Satkosia
- (d) River Colorado has the Grand Canyon along its valley

95. Match List I with List II and select the correct answer using the code given below the lists :



*List I*  
(Places indicated  
in the map)

- A. 1  
B. 2  
C. 3  
D. 4

**Code :**

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 1 | 3 | 4 |
| (b) | 2 | 3 | 1 | 4 |
| (c) | 4 | 3 | 1 | 2 |
| (d) | 4 | 1 | 3 | 2 |

*List II*  
(Seismic zone)

1. Zone V  
2. Zone IV  
3. Zone III  
4. Zone II

96. Arrange the following Military Training Institutes in India in terms of their geographical location from North to South :

1. Indian Military Academy
2. Officers' Training Academy
3. National Defence Academy
4. National Defence College
5. College of Defence Management

Select the correct answer using the code given below :

- (a) 1, 3, 5, 4, 2  
(b) 1, 4, 3, 5, 2  
(c) 4, 5, 3, 2, 1  
(d) 3, 4, 1, 2, 5

97. Which among the following statements characterized El Nino ?

1. It occurs at irregular intervals
2. It carries warmer water
3. It carries less saline water
4. Its atmospheric equivalent is southern oscillation

Select the correct answer using the code given below :

- (a) 1 and 2 only  
(b) 2 and 3 only  
(c) 3 and 4 only  
(d) 1, 2, 3 and 4

98. Consider the following statements regarding Andaman and Nicobar Islands :

1. It enjoys equatorial climate
2. This is the only place in India where a volcano is located
3. This is the only place in India where coral bed is found

Which of the statements given above is/are correct ?

- (a) 1, 2 and 3  
(b) 1 and 2 only  
(c) 2 and 3 only  
(d) 1 only

99. Which of the following has/have been declared as national waterways in India ?

1. The Allahabad-Haldia stretch of river Ganga
2. The Sadiya-Dhubri stretch of river Brahmaputra
3. The Cherla-Rajamundry stretch of river Godavari

Select the correct answer using the code given below :

- (a) 1 and 2 only  
(b) 2 and 3 only  
(c) 1 only  
(d) 1, 2 and 3

100. Consider the following statements :

1. In a cyclone, the direction of wind flow is counter clockwise in the northern hemisphere
2. The tropical cyclone fades away when it reaches land because there is no large supply of warm moist air

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

101. Which among the following statements about the North Atlantic Drift is/are correct ?

1. It keeps the west coast of Northern Europe ice free
2. It is responsible for the warm air mass which interacts with the cold air mass from the Polar region and causes rainfall in Western Europe
3. It meets the Labrador current near Vancouver Island and causes dense fog

Select the correct answer using the code given below :

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 2 only
- (d) 1 and 3 only

102. Which one among the following explains the earthquakes of the eastern margins of Asia ?

- (a) Subduction of Pacific plate under Asiatic plate
- (b) Subduction of African plate below European plate
- (c) Subduction of Indian plate under Asiatic plate
- (d) Subduction of American plate under the Pacific plate

103. Unlike other Meridians International Date Line is drawn zigzag in order to :

- (a) permit certain land areas and groups of islands to have the same calendar day
- (b) facilitate the sailors to adjust time in their watch
- (c) adjust the day in calendar while sailing from east to west and vice versa
- (d) make 180°E and 180°W coterminous

104. The time difference between the two cities, city A (30' N 60' E) and city B(30' N 80' E) would be :

- (a) 80 minutes
- (b) 0 minute
- (c) 20 minutes
- (d) 34 minutes

105. Consider the following statements :

1. The tropical year is shorter than the sidereal year
2. The solar day is longer than the sidereal day

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

106. Consider the following statements about rocks :

1. Shale becomes Slate through metamorphosis
2. Shale is converted to Slate when it is subjected to tremendous pressure and high temperature

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

107. Which of the following statements is/are correct ?

1. Mumbai receives more rainfall than Pune because it is located at the windward side of Western Ghats
2. Vidarbha region experiences semi-arid climate as it is located in a rain shadow region
3. In India monsoon reaches Kashmir valley at the last

Select the correct answer using the code given below :

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1 only

108. Which of the following statements regarding south-west monsoon in India is/are correct ?

1. Monsoon reaches the Malabar coast first
2. Rajasthan does not get rainfall from south west monsoon
3. South-west monsoon retreats when the permanent wind belts start shifting to the south

Select the correct answer using the code given below :

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 3 only
- (d) 1 and 3 only

109. Which one of the following is the correct sequence of the four stages of water movement in a hydrological cycle ?

- (a) Evaporation–Condensation–Precipitation–Infiltration
- (b) Evaporation–Precipitation–Condensation–Infiltration
- (c) Infiltration–Evaporation–Condensation–Precipitation
- (d) Condensation–Precipitation–Evaporation–Infiltration

110. Match List I with List II and select the correct answer using the code given below the Lists :

<i>List I</i>	<i>List II</i>
<i>(Agents of erosion)</i>	<i>(Topographical feature)</i>
A. Running water	1. Cirque
B. Glacier	2. Barchan
C. Wind	3. Rift Valley
D. Underground water	4. Doline
	5. Gorge

**Code :**

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 5 | 1 | 2 | 4 |
| (b) | 5 | 2 | 1 | 3 |
| (c) | 4 | 2 | 1 | 5 |
| (d) | 3 | 4 | 1 | 2 |

111. Which among the following are the properties of good paint ?

- 1. The paint should be opaque and have high covering power
- 2. The solid particles in paint should reflect much of the destructive light to ensure long life of the paint
- 3. Combination of pigments, e.g., white lead and  $TiO_2$  give better result
- 4. Addition of plasticiser destroy the elasticity of the film and leads to cracking

Select the correct answer using the code given below :

- (a) 1, 2 and 4
- (b) 1, 2 and 3
- (c) 2 and 3 only
- (d) 1 and 3 only

112. By which one among the following mechanism, soap removes dirt (soil) from cloth ?

- (a) Soap dissolves the soil as such
- (b) Soap reacts with soil and converts them into soluble silicates
- (c) Soap takes away the oily part of the soil and thus separates the soil from the cloth
- (d) The soap molecules bind with the soil, lift the soil and keep it suspended which can then be rinsed away

113. Which one among the following statements is *not* correct about graphite ?

- (a) It is the most stable allotrope of carbon
- (b) It is an electrically conducting material
- (c) Crystalline spherical beads of graphite have very good lubricating property under dry conditions
- (d) It is the highest grade of coal

114. Which one among the following is *not* a property of salt ?

- (a) Salts have ordered packing arrangements called lattices
- (b) Salts have low melting points but high boiling points
- (c) Salts are brittle
- (d) Salts conduct electricity when dissolved in water or even in the molten state

115. Which among the following statements with regard to pH scale is/are correct ?

1. It is a logarithmic scale
2. The scale is limited to 0—14 because the ionic product of water is about  $10^{-14}$
3. The lower the value of pH the greater is the acidity of the solution

Select the correct answer using the code given below :

- (a) 1 and 2 only
- (b) 1, 2 and 3
- (c) 1 and 3 only
- (d) 2 only

116. An oxidizing agent is a substance which :

- (a) increases the oxidation number of an element in a given substance
- (b) decreases the oxidation number of an element in a given substance
- (c) is oxidized itself in an oxidation-reduction reaction
- (d) loses electrons in an oxidation-reduction reaction

117. Neutral water with pH about 7 becomes slightly acidic when aerated. This is because :

- (a) oxygen from air is dissolved in the water which makes the water acidic
- (b) dirt, which get contaminated with the water during aeration makes the water acidic
- (c) ultraviolet radiation dissociates water molecules and makes water acidic
- (d) carbon-dioxide from air is dissolved

118. Which one of the following statements is *not* correct ?

- (a) Diesel burns with air in a diesel engine at a high temperature at which nitrogen and oxygen from air can combine whereas petrol burns at a lower temperature at which nitrogen and oxygen can not combine
- (b) Diesel contains some nitrogenous compounds whereas petrol does not
- (c) Nitrogen from air is easily dissolved in diesel but it is not soluble in petrol
- (d) A catalyst is used in diesel engines which contains nitrogen whereas petrol engines do not need such catalysts

119. Consider the following statements with regard to the properties of water :

1. Water is a good solvent for ionic compound but poor solvent for covalent compound
2. Water is a good solvent for covalent compound but poor solvent for ionic compound
3. Water has maximum density at the temperature 277 K

Which of the statements given above are correct ?

- (a) 1 and 3 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

120. Calcium carbonate is naturally available as limestone and can also be synthesized from quick lime. It is seen that the composition of the elements in both the natural and synthetic calcium carbonate are same. The validity of which one among the following laws is confirmed by this observation ?

- (a) Law of conservation of mass
- (b) Law of definite proportion
- (c) Law of multiple proportion
- (d) Avogadro's law

121. When aqueous solutions of two salts are mixed, the third salt formed may appear as a solid precipitates or a clear solution depending upon the solubility of its ions. It is observed that all salts of Na, K,  $\text{NH}_4$  are soluble. All nitrates and bicarbonates are also soluble. All halides (chlorides, bromides, iodides) are soluble except those of Ag, Hg (I) and Pb. All sulphates are soluble except those of Ag, Ca, Ba and Pb. Which one among the following combinations of solutions will produce a solid precipitate ?

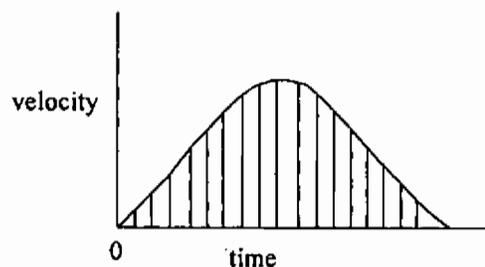
- (a) Sodium sulphate and barium chloride
- (b) Magnesium sulphate and barium bicarbonate
- (c) Lithium iodide and barium chloride
- (d) Ammonium sulphate and potassium bromide

122. A mixture containing  $\text{SiO}_2$ , NaCl and  $\text{NH}_4\text{Cl}$  is taken for separating the constituents. The suitable steps required for this are :

- (a) Sublimation-dissolution-filtration-crystallization
- (b) Dissolution-filtration-crystallization-distillation
- (c) Sublimation-evaporation-dissolution-decomposition
- (d) Dissolution-distillation-decomposition-evaporation

123. Iodized salt is a :
- mixture of potassium iodide and common salt
  - mixture of molecular iodine and common salt
  - compound formed by combination of potassium iodide and common salt
  - compound formed by combination of molecular iodine and common salt
124. Which one among the following is a chemical process ?
- Distillation of sea (salty) water
  - Crystallization of impure salt (NaCl)
  - Production of iodine ( $I_2$ ) from sea-weeds
  - Sublimation of iodine ( $I_2$ )
125. Which one among the following statements regarding the properties of mixtures and compounds is *not* correct ?
- A mixture shows the properties of its constituents but the properties of a compound are entirely different from its constituents
  - A mixture may be homogeneous or heterogeneous but a compound is a homogeneous substance
  - The constituents of a mixture can be separated by physical methods but those of a compound can not be separated by physical method
  - Energy is either absorbed or evolved during the preparation of a mixture but not in the preparation of a compound

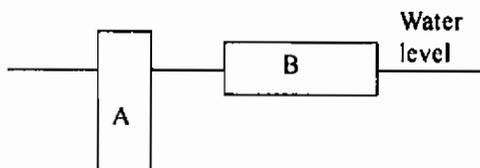
126.



Which one of the following characteristics of the particle does the shaded area of the velocity-time graph shown above represent ?

- Momentum
  - Acceleration
  - Distance covered
  - Speed
127. A body is at rest on the surface of the earth. Which one among the following statements is correct regarding this ?
- No force is acting on the body
  - Only weight of the body acts on it
  - Net downward force is equal to the net upward force
  - None of the above statements is correct
128. A pendulum beats faster than a standard pendulum. In order to bring it to the standard beat, the length of the pendulum is to be :
- reduced
  - increased
  - reduced and the mass of the bob increased
  - reduced and also the mass of the bob reduced

129.



Two identical blocks of ice, A and B, float in water as shown in the figure given above. Which one among the following statements in this regard is correct ?

- (a) Block A displaces a greater volume of water since the pressure acts on a smaller bottom area
- (b) Block A displaces a greater volume of water since its submerged end is lower in the water
- (c) Block B displaces a greater volume of water since its submerged end has a greater area in water
- (d) The two blocks displace equal volumes of water since they have the same specific gravity and same mass

130. When a ship floats on water :

- (a) it displaces no water
- (b) the mass of water displaced is equal to the mass of the ship
- (c) the mass of water displaced is lesser than the mass of the ship
- (d) the mass of water displaced is greater than the mass of the ship

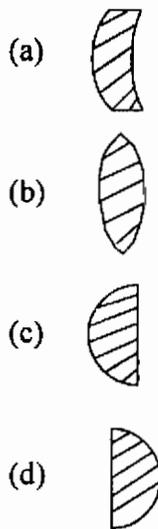
131. Sound moves with higher velocity if :

- (a) pressure of the medium is decreased
- (b) temperature of the medium is increased
- (c) humidity of the medium is increased
- (d) both (b) and (c) above

132. Which one of the following is the correct angle between the incident and reflected rays when a ray of light incident normally on a plane mirror ?

- (a)  $180^\circ$
- (b)  $90^\circ$
- (c)  $45^\circ$
- (d)  $0^\circ$

133. Which one of the following four glass lenses is a diverging lens ?



134. Magnetism of a bar magnet can be destroyed if it is :

1. kept in the magnetic meridian.
2. placed in a direction opposite that of the Earth's horizontal intensity.
3. heated to a temperature known as Curie temperature.

Select the correct answer using the code given below :

- (a) 1 and 3 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

135. Capacity of a parallel plate condenser can be doubled by :

1. doubling the areas of the plates
2. doubling the distance of separation between the plates
3. reducing the distance of separation between the plates to half the original separation
4. doubling both the areas of the plates and the distance of separation between the plates

Select the correct answer using the code given below :

- (a) 1 and 4
- (b) 1 and 3
- (c) 3 only
- (d) 2 and 3

136. If two conducting spheres are separately charged and then brought in contact :
- (a) the total energy of the two spheres is conserved
  - (b) the total charge on the spheres is conserved
  - (c) both the total energy and charge are conserved
  - (d) the final potential is always the mean of the original potential of the two spheres

137. Two pieces of metallic wire having equal length and equal volume placed in air have different resistances. The two wires must :
- (a) have different cross sections
  - (b) have different temperatures
  - (c) be of different materials
  - (d) be of same density

138. If a heater coil is cut into two equal parts and only one part is used in the heater, the heat generated will be :
- (a) doubled
  - (b) four times
  - (c) one-fourth
  - (d) halved

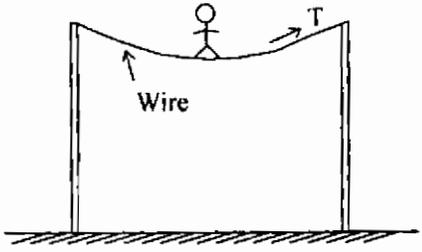
139. The direction of magnetic field at a point due to an infinitely long wire carrying current is :
- (a) parallel to the current
  - (b) antiparallel to the current
  - (c) along the perpendicular drawn from a point on the wire
  - (d) perpendicular to the plane containing the conductor and the point

140. A hollow metal ball carrying an electric charge produces no electric field at points :
- (a) outside the sphere
  - (b) on its surface
  - (c) inside the sphere
  - (d) only at the centre

141. A man is sitting on a rotating stool with his arms outstretched. If suddenly he folds his arm the angular velocity of the man would :
- (a) increase
  - (b) decrease
  - (c) become zero
  - (d) remain constant

142. For a particle revolving in a circular path, the acceleration of the particle is :
- (a) along the tangent
  - (b) along the radius
  - (c) zero
  - (d) along the circumference of the circle

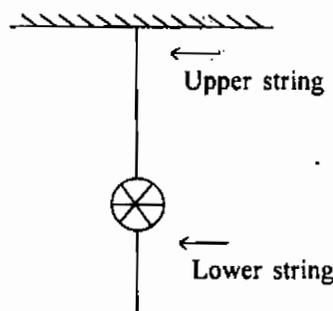
143.



A circus performer of mass  $M$  is walking along a wire as shown in the figure given above. The tension  $T$  in the wire is : ( $g$  = acceleration due to gravity)

- (a) approximately  $Mg$
- (b) less than  $Mg$
- (c) more than  $Mg$
- (d) depends on whether the performer stands on one or two feet

144.



A heavy ball is suspended as shown in the figure given above. A quick jerk on the lower string will break that string but a slow pull on the lower string will break the upper string. The first result occurs because :

- (a) the force is too small to move the ball  
 (b) air friction holds the ball back  
 (c) of action and reaction  
 (d) the ball has inertia
145. The visible light has a wavelength range from about 380 nm (violet) to 780 nm (red). If an excited object emits light with wavelength of 15 nm, to which one of the following ranges does it belong ?
- (a) X-ray  
 (b) Gamma ray  
 (c) Infrared  
 (d) Ultraviolet
146. Microwave oven consumes less power due to :
- (a) small frequency of radiation  
 (b) short wavelength of radiation  
 (c) large frequency as well as wavelength of radiation  
 (d) small frequency as well as wavelength of radiation
147. The sun is constantly radiating energy and yet its surface temperature is nearly constant at  $6000^{\circ}\text{C}$ . The constancy of solar temperature is due to :
- (a) fission  
 (b) radioactivity  
 (c) fusion  
 (d) black hole evaporation
148. An annular solar eclipse occurred during January 2010 with duration of annularity around 12 minutes. It is predicted that such long annular duration will not occur till the year 3043. Such prediction is possible due to :
- (a) Einstein's theory of relativity  
 (b) Darwin's theory of natural selection  
 (c) Newton's theory of gravitation  
 (d) Hawking's theory of black hole
149. Internet communication uses optical fibre cables because of :
- (a) low cost  
 (b) free from virus threat  
 (c) high data carrying capacity  
 (d) faster than light communication of signals
150. Metal pipes used to carry water sometimes burst in the winter. This is because :
- (a) water expands when it freezes  
 (b) metal contracts more than water  
 (c) outside of the pipe contracts more than inside  
 (d) metal expands more than water