PHYSICS

1. An object is placed at a distance 30 *cm* from a convex mirror of focal length 15 *cm*. The image formed is

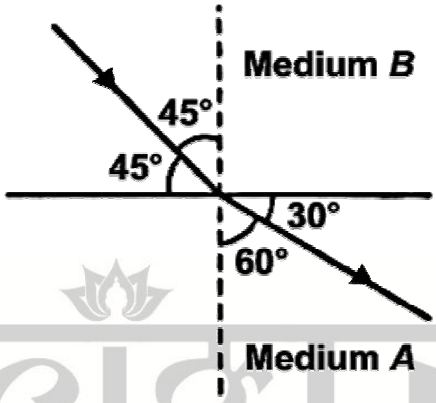
(a) 20 *cm* from the pole

(b) real and magnified – 10 *cm* from the pole

(c) + 10 *cm* from the pole

(d) + 60 *cm* from the pole

2. Figure shows a ray of light as it travel from medium *A* to medium *B*. The refractive index of medium *B* relative to medium *A* is



(a) $\frac{\sqrt{3}}{\sqrt{2}}$

(b) $\frac{\sqrt{2}}{\sqrt{3}}$

(c) $\frac{1}{\sqrt{2}}$

(d) $\frac{\sqrt{2}}{2}$

3. A light bulb is placed between two plane mirrors inclined at angle of 60°. The number of images formed are

(a) 6 (b) 2 (c) 5 (d) 4

4. A plane mirror makes an angle of 30° with horizontal. If a vertical ray strikes the mirror. Find the angle between mirror and the reflected ray

(a) 30° (b) 60°

(c) 90° (d) 45°

5. An object is placed at distance *f* from the convex mirror of focal length *f*. The distance of the image from the pole of mirror is

(a) infinite

(b) $\frac{f}{2}$

(c) $\frac{3f}{2}$

(d) $2f$

6. When an object is at distances of x_1 and x_2 from the pole of a concave mirror, images of same size are formed, the focal length of the mirror is

(a) $x_1 + x_2$ (b) $\frac{x_1 + x_2}{2}$

(c) $(x_1 x_2)^{1/2}$ (d) $(x_1^2 + x_2^2)^{1/2}$

7. The distance between an object and its real image formed by a lens is 100 *cm*. If image height is three times of object height, the focal length of the lens is

(a) $\frac{25}{4} cm$ (b) $\frac{50}{4} cm$

(c) $\frac{75}{2} cm$ (d) $\frac{75}{4} cm$

8. By a convex lens, area of real image is 16 times that of square object. If the distance of object is 30 *cm* from lens, the focal length of the lens is

(a) 12 *cm* (b) 24 *cm*

(c) 6 *cm* (d) 18 *cm*

9. A fish looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is 4/3 and the fish is 12 cm below the surface, the radius of the circle is :

(a) $12 \times 3 \times \sqrt{5}\ cm$ (b) $12 \times 3 \times \sqrt{7}\ cm$

(c) $12 \times \sqrt{5/2}\ cm$ (d) $12 \times \frac{3}{\sqrt{7}}\ cm$

10. Two thin lenses of focal lengths 20 cm and 25 cm are placed in contact. The effective power of the combination is :

(a) $\frac{1}{9}$ dioptre (b) 45 dioptre

(c) 6 dioptre (d) 9 dioptre

11. The linear magnification for a mirror is the ratio of the size of the image to the size of the object, and is denoted by *m*. Then *m* is equal to (symbols have their usual meanings) :

(a) $\frac{u f}{u - f}$ (b) $\frac{u f}{u - f}$

(c) $\frac{f}{u - f}$ (d) None of these

12. A spherical mirror and spherical lens have each focal length of $-10\ cm$. The mirror and lens are :

(a) Both convex (b) Both concave

(c) Mirror is convex and lens is concave (d) Mirror is concave and lens is convex

13. The refractive index of air relative to glass is 2/3 and that of diamond relative to air is 12/5. The refractive index of glass relative to diamond is :

(a) $\frac{5}{18}$ (b) $\frac{8}{9}$ (c) $\frac{5}{8}$ (d) $\frac{18}{5}$

14. The distance of the eye lens from the retina is x. For a normal eye, the maximum focal length of the eye lens is :

(a) $< x$ (b) $> x$

(c) $2x$ (d) x

15. The intensity of scattered light depends on the wavelength of incident light ?

(a) $I \propto \lambda^4$ (b) $I \propto \lambda^{-4}$

(c) $I \propto \lambda^2$ (d) $I \propto \lambda^{-2}$

CHEMISTRY

16. The acid used in making of vinegar is -

(a) Formic acid (b) Acetic acid

(c) Sulphuric acid (d) Nitric acid

17. Common name of H_2SO_4 is -

(a) Oil of vitriol (b) Muriatic acid

(c) Blue vitriol (d) Green vitriol

18. $CuO + (X) \rightarrow CuSO_4 + H_2O$. Here (X) is

(a) $CuSO_4$ (b) HCl

(c) H_2SO_4 (d) HNO_3

19. Which of the following is the weakest base ?

(a) NaOH (b) NH_4OH

(c) KOH (d) $Ca(OH)_2$

20. When CO_2 is passed through lime water, it turns milky. The milkness is due to the formation of

(a) $CaCO_3$ (b) $Ca(OH)_2$

(c) H_2O (d) CO_2

21. Caustic soda is the common name for -

(a) $Mg(OH)_2$ (b) KOH

(c) $Ca(OH)_2$ (d) NaOH

22. Calcium hydroxide (slaked lime) is used in -

(a) Plastics and dyes (b) Fertilizers

(c) Antacids (d) White washing

23. One of the following is an exothermic reaction, This is :

(a) electrolysis of water (b) conversion of limestone into quickline

(c) process of respiration (d) process of photosynthesis

24. The chemical equations are balanced to satisfy one of the following laws in chemical reactions. This law is known as :

(a) law of conservation of momentum (b) law of conservation of mass

(c) law of conservation of motion (d) law of conservation of magnetism

25. A white precipitate can be obtained by adding dilute sulphuric acid to :

(a) $CuSO_4$ solution (b) NaCl solution

(c) $BaCl_2$ solution (d) Na_2SO_4 solution

26. A white precipitate will be formed if we add common salt solution to :

(a) $Ba(NO_3)_2$ solution (b) KNO_3 solution

(c) $AgNO_3$ solution (d) $Ma(NO_3)_2$ solution

27. Consider the following equation of the chemical reaction of a metal M :

$4M + 3\ O_2 \longrightarrow 2M_2O_3$

This equation represents

(a) combination reaction as well as reduction reaction

(b) decomposition reaction as well as oxidation reaction

(c) oxidation reaction as well as displacement reaction

(d) combination reaction as well as oxidation reaction

28. The process of respiration is :

(a) an oxidation reaction which is endothermic

(b) a reduction reaction which is exothermic

(c) a combination reaction which is endothermic

(d) an oxidation reaction which is exothermic

29. Which of the following can be decomposed by the action of light ?

(a) NaCl (b) KCl

(c) AgCl (d) CuCl

30. Formation of carbon disulphide from carbon and sulphur takes place by

(a) absorption of heat (b) evolution of heat

(c) no change in heat content (d) None of the above

MATHEMATICS

31. A number $\frac{p}{q}$, when expressed in decimal form, terminates after 7 digits, then factors of q are of the form $x^m \times y^n$; the value of x + y should be :

(a) 7 (b) 14

(c) 9 (d) 26

32. There is a circular path around a field. Reema takes 22 minutes to complete one round while her friend Saina takes 20 minutes to complete the same. If they both start at the same time and move in the same direction after how many minutes will they meet again at the starting

(a) 220 (b) 3.4

(c) 440 (d) 4.4

33. Given that two of the zeroes of the cubic poly–nomial $ax^3 + bx^2 + cx + d$ are 0, the third zero is

(a) $\frac{-b}{a}$ (b) $\frac{b}{a}$

(c) $\frac{c}{a}$ (d) $-\frac{d}{a}$

34. If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is – 3, then the value of k is

(a) $\frac{4}{3}$ (b) $\frac{-4}{3}$

(c) $\frac{2}{3}$ (d) $\frac{-2}{3}$

35. If $4x^2 - 6x - m$ is divisible by $x - 3$, the value of m is exact divisor of

(a) 9 (b) 45

(c) 20 (d) 36

36. For what value of k, do the equations $2x - 3y + 10 = 0$ and $3x + ky + 15 = 0$ represent coincident lines

(a) $\left(\frac{-9}{2}\right)$ (b) – 11

(c) $\frac{9}{2}$ (d) – 7

37. If the lines given by $2x + ky = 1$ and $3x - 5y = 7$ are parallel, then the value of k is

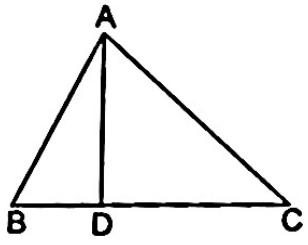
(a) $\frac{-10}{3}$ (b) $\frac{10}{3}$

(c) – 13 (d) – 7

38. The difference between a two digit number and the number obtained by interchanging the digits is 27. What is the difference between the two digits of the number ?

(a) 9 (b) 6 (c) 12 (d) 3

39. In $\angle BAC = 90°$ and $AD \perp BC$. A. Then



(a) $BD.CD = BC^2$ (b) $AB.AC = BC^2$

(c) $BD.CD = AD^2$ (d) $AB.AC = AD^2$

40. ABC and BDE are two equilateral triangles such that D is mid–point of BC. Ratio of the areas of triangle ABC and BDE is

(a) 2 : 1 (b) 1 : 4

(c) 1 : 2 (d) 4 : 1

41. The area of the triangle whose vertices are A(1, 2), B(– 2, 3) and C(– 3, – 4) is

(a) 11 (b) 22 (c) 33 (d) 21

42. The line segment joining the points (3, –1) and (– 6, 5) is trisected. The coordinates of point of trisection are

(a) (3, 3) (b) (– 3, 3)

(c) (3, – 3) (d) (– 3, – 3)

43. If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A$ is equal to

(a) – 1 (b) 0

(c) 1 (d) None of these

44. $3\sin^2 20° - 2\tan^2 45° + 3\sin^2 70°$ is equal to

(a) 0 (b) 1 (c) 2 (d) – 1

45. Find ratio in which line joining of points A(– 7, –1) and B(8, 2) is divided by x + y = 2 ?

(a) 5 : 4 (b) 4 : 3 (c) 3 : 2 (d) 6 : 5

BIOLOGY

46. A few drops of iodine solution were added to rice water. The solution turned blue–black in color. This indicates that rice water contains

(a) Complex proteins (b) Simple proteins

(c) Fats (d) Starch

47. Which is the correct sequence of parts in human alimentary canal ?

(a) Mouth → stomach → small intestine → oesophagus → large intestine

(b) Mouth → oesophagus → stomach → large intestine → small intestine

(c) Mouth → stomach → oesophagus → small intestine → large intestine

(d) Mouth → oesophagus → stomach → small intestine → large intestine

48. Which part of alimentary canal receives bile from the liver ?

(a) Stomach (b) Small intestine

(c) Large intestine (d) Oesophagus

49. Single circulation i.e., blood flows through the heart only once during one cycle of passage through the body, is exhibited by

(a) Labeo, Chameleon, Salamander (b) Hippocampus, Exocoetus, Anabas

(c) Hyla, Rana, Draco (d) Whale, Dolphin, Turtle

50. The recessive gene is the one that expresses itself in –

(a) Homozygous condition (b) Heterozygous condition

(c) F2 generation (d) None of these

51. Transport of food material in higher plants takes place through

(a) Tracheids (b) Transfusion tissue

(c) Companion cells (d) Sieve elements

52. Gametes are formed as a result of –

(a) Mitosis (b) Meiosis

(c) Cell division (d) Reproduction

53. Pollutant majorly responsible for ozone layer depletion is –

(a) Sulphur dioxide (b) Nitrous oxide

(c) Chlorofluorocarbon (d) Methanes

54. Disposable plastic plates should not be used because

(a) They are made up of material with light weight

(b) They are made of toxic material

(c) They are made up of biodegradable material

(d) They are made up of non–biodegradable material

55. The decomposers in an ecosystem

(a) Convert inorganic material, to simpler forms

(b) Convert organic material to inorganic forms

(c) Convert inorganic materials into organic compounds

(d) Do not breakdown organic compounds

56. What is likely to happen if the number of frogs in the food chain given below decreases ?

Grass $\rightarrow$ Grasshopper $\rightarrow$ Frog $\rightarrow$ Snake

(a) The population of snakes decreases (b) The population of grasshoppers increases

(c) The shortage of grass plants (d) All of these

57. Which of the following statement is incorrect ?

(a) All green plants and blue green algae are producers

(b) Green plants get their food from organic compounds

(c) Producers prepare their own food from inorganic compounds

(d) Plants convert solar energy into chemical energy

58. Select the incorrect statement.

(a) Frequency of certain genes in a population change over several generations resulting in evolution

(b) Reduction in weight of the organism due to starvation is genetically controlled

(c) Low weight parents can have heavy weight progeny

(d) Traits which are not inherited over generations do not cause evolution

59. Which of the following statements is incorrect ?

(a) For every hormone there is a gene

(b) For every protein there is a gene

(c) For production of every enzyme there is a gene

(d) For every molecule of fat there is a gene

60. Maleness of a child is determined by

(a) Y chromosome in zygote (b) X chromosome in zygote

(c) By chance (d) Cytoplasm of the germ cell

MENTAL ABILITY

61. A clock is set to show the correct time at 11 a.m. The clock gains 12 minutes in 12 hours. What will be the true time when the clock indicates 1 p.m. on the 6th day?

(a) 10 a.m. (b) 11 a.m.

(c) 12 noon (d) None of these

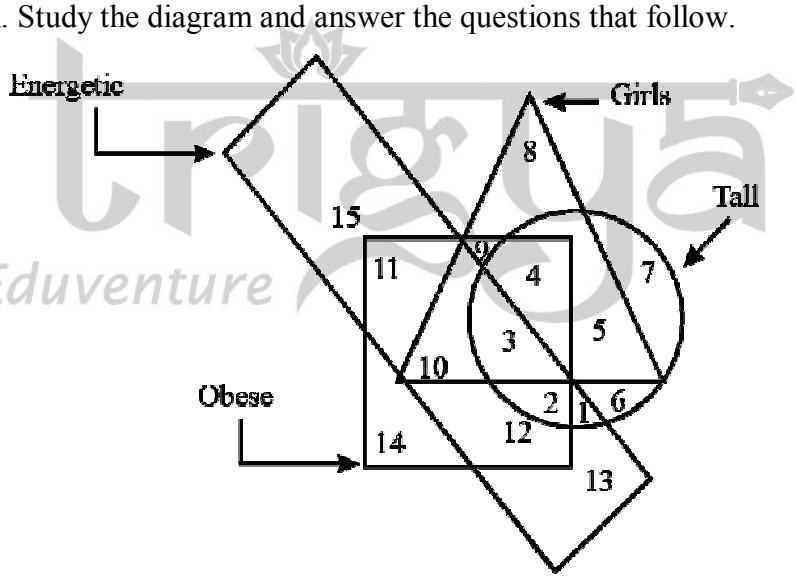
62. Which day can be the first day and last day of any century?

(a) Monday (b) Tuesday

(c) Friday (d) Wednesday

Direction (Q.63 & Q.64)

The following questions are based on the diagram given below. In the diagram, circle represents tall children, the square represents obese children, rectangle represents the energetic children and the triangle represents girl children. Study the diagram and answer the questions that follow.



63. Which areas represent energetic children who are not obese ?

(a) 1, 13 and 15 (b) 13 and 15

(c) 1, 11 and 15 (d) 6, 13 and 15

64. Which of the following areas represent obese and energetic children, who are neither girls nor tall ?

(a) 2 and 12 (b) 3 and 10

(c) 2 and 3 (d) 11 and 12

Direction (Q.65 & Q.66) :

In a certain code language if

'pit na sa' means 'you are welcome'

'na ho pa la' means 'They are very good'

'ka da la' means 'who is good'

'od ho pit la' means 'they welcome good people'

65. Which of the following means 'people' in that code language?

(a) ho (b) pit

(c) la (d) od

66. Which of the following means 'very' in that code language?

(a) na (b) da

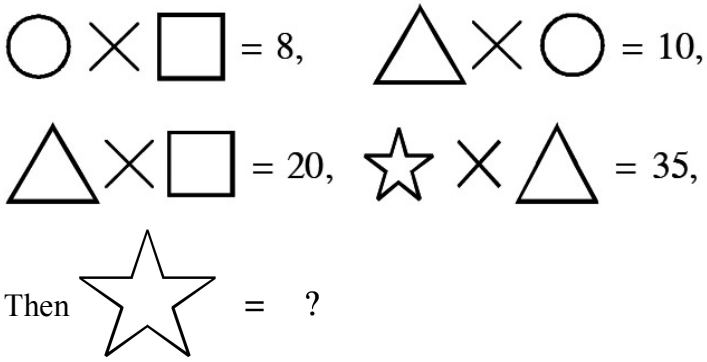
(c) pa (d) data inadequate

67. A watch, which gains uniformly, is 2 min, slow at noon on Sunday, and is 4 min 48 seconds fast at 2 PM on the following Sunday. When was it correct ?

(a) 2 : 00 PM on Tuesday (b) 12 Noon on Monday

(c) 2 : 00 AM on Tuesday (d) None of these

68. In a coded language:



(a) 2 (b) 4

(c) 7 (d) 5

69. Pointing out to a lady, a girl said "She is the daughter-in-law of the grand mother of my father's only son" How is the lady related to the girl ?

(a) Sister-in-law (b) Mother

(c) Aunt (d) Cousin

70. Following question has a set of four statements. Each statement has three segments. Choose the alternative where the third segment in the statement can be logically deduced using both the preceding two but not just from one of them.

(A) Dinosaurs are pre-historic creatures. Water-buffaloes are not dinosaurs. Water buffaloes are not pre-historic creatures.

(B) All politicians are frank. No frank people are crocodiles. No crocodiles are politicians.

(C) No diamond is quartz. No opal is quartz. Diamonds are opals.

(D) All monkeys like bananas. Some GI Joes like bananas. Some GI Joes are monkeys.

(a) C only (b) B only

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

71. In certain code, BOXER is written as AQWGQ. How VISIT is written in that code?

(a) UKRKU (b) UKRKS

(c) WKRKU (d) WKRKS

72. In the following question on multiplication, Each letter always stand for same digit

$$\begin{array}{r} A\ M\ D \\ \times\ D\ A \\ \hline M\ P\ R \\ J\ M\ S\ \ \\ \hline B\ P\ S\ R \end{array}$$

For which digit D stands ?

(a) 3 (b) 8 (c) 9 (d) 7

73. There are 16 secret agents who each know a different piece of secret information. They can telephone each other and exchange all the information they know. After the telephone call, they both know everything that either of them knew before the call.

What is the minimum number of telephone calls required so that all of them know everything?

(a) 28 (b) 53

(c) 120 (d) None of these

74. Rahul told Anand, "Yesterday I defeated the only brother of the daughter of my grandmother". Whom did Rahul defeat ?

(a) Son (b) Father

(c) Brother (d) Father-in-law

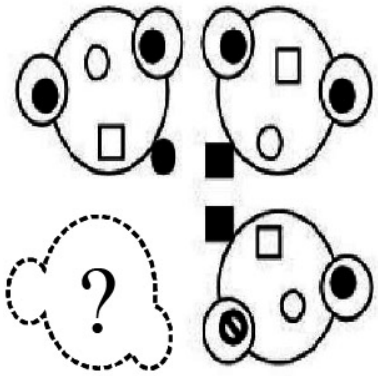
75. Find the missing term ?

7	11	14
8	?	10
9	10	16
6	10	8

(a) 8 (b) 12

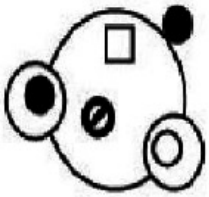
(c) 9 (d) 11

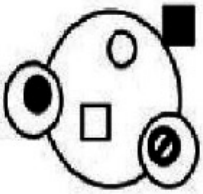
76. For the following question, select the option which most logically and simply completes the diagram:



(a) 

(b) 

(c) 

(d) 

77. Each question consists of five statements followed by options consisting of three statements put together in a specific order. Choose the option which indicates a valid argument, that is, where the third statement is conclusion drawn from the preceding two statements.

(A) Migration of people augments housing problem in urban areas.

(B) Increase in housing problem is urban areas in detrimental to economic growth.

(C) Migration of people is detrimental to economic growth.

(D) Some migration does not cause increase in urban housing problem.

(E) Some migration is not detrimental to economic growth.

(a) CBA (b) BDE

(c) CDE (d) BAC

Direction : (Q.78 & Q.79) :

The Vice Chancellor of a University wants to select a team of five members as the organizing committee for the next convocation of the University to be held in March 2015. The committee members are to be selected from five short listed professors (Prof. Ahuja, Prof. Banerjee, Prof, Chakravarty, Prof. Equbal, Prof. Das) and four short listed students (Prakash, Queen, Ravi and Sushil). Some conditions for selection of the committee members are given below :

(i) Prof. Ahuja and Sushil have to be together

(ii) Prakash cannot be put with Ravi

(iii) Prof. Das and Queen cannot go together

(iv) Prof. Chakravarty and Prof. Equbal have to be selected

(v) Ravi cannot be selected with Prof. Banerjee.

78. If two members of the committee are students and Prof. Das is one of the members of the committee, who are the other committee members ?

(a) Prof.Benerjee, Prof.Chakravarty, Prakash and Queen

(b) Prof.Ahuja, Prof.Banerjee, Sushil and Prakash

(c) Prof.Chakravarty, Prof.Equbal, Prakash and Sushil

(d) None of the above

79. In case Prof. Ahuja and Prof. Chakravarty are members, who are the other members who cannot be selected for the committee ?

(a) Prof. Benerjee, Prof. Equbal and Sushil

(b) Prof. Equbal, Sushil and Prakash

(c) Prof. Equbal, Prakash and Queen

(d) None of the above

80. If in a particular year 'X' there are 53 Sundays, then how many Sundays will be there in a period of four years X to X + 3 year.

(a) 208 (b) 209

(c) 208 or 209 (d) None of these

ANSWER KEY

PHYSICS

1. (c)	**4.** (b)	**7.** (d)	**10.** (d)	**13.** (c)
2. (a)	**5.** (b)	**8.** (b)	**11.** (c)	**14.** (d)
3. (c)	**6.** (b)	**9.** (d)	**12.** (b)	**15.** (b)

CHEMISTRY

16. (b)	**19.** (b)	**22.** (d)	**25.** (c)	**28.** (d)
17. (a)	**20.** (a)	**23.** (c)	**26.** (c)	**29.** (c)
18. (c)	**21.** (d)	**24.** (b)	**27.** (d)	**30.** (a)

MATHEMATICS

31. (a)	**34.** (a)	**37.** (a)	**40.** (d)	**43.** (c)
32. (a)	**35.** (d)	**38.** (d)	**41.** (a)	**44.** (b)
33. (a)	**36.** (a)	**39.** (c)	**42.** (b)	**45.** (a)

BIOLOGY

46. (d)	**49.** (b)	**52.** (b)	**55.** (b)	**58.** (b)
47. (d)	**50.** (a)	**53.** (c)	**56.** (d)	**59.** (d)
48. (b)	**51.** (d)	**54.** (d)	**57.** (b)	**60.** (a)

MENTAL ABILITY

61. (b)	**65.** (d)	**69.** (b)	**73.** (a)	**77.** (d)
62. (a)	**66.** (c)	**70.** (b)	**74.** (b)	**78.** (d)
63. (a)	**67.** (a)	**71.** (b)	**75.** (c)	**79.** (d)
64. (d)	**68.** (c)	**72.** (a)	**76.** (d)	**80.** (b)