# FIITJEE Medical Admission Test

# (SAMPLE PAPER)

*for* students presently in **Class XI**

# Paper-2

*Time: 3 Hours (14:00 pm – 17:00 pm)* | **Code** | **1102** | *Maximum Marks: 720*

**Instructions:**

*Caution: Class, Paper, Code as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong Class, Paper or Code will give wrong results.*

1. **You are advised to devote 60 Minutes on Section-I, 60 Minutes on Section-II and 60 Minutes on Section-III.**

2. **This Question paper consists of 3 sections. Marking scheme is given in table below:**

| Section | Subject | | Question no. | Marking Scheme for each question | |
|---|---|---|---|---|---|
| | | | | correct answer | wrong answer |
| **SECTION – I** | BIOLOGY | (PART-A) | 1 to 90 | **+4** | **-1** |
| **SECTION – II** | PHYSICS | (PART-A) | 1 to 45 | **+4** | **-1** |
| **SECTION – III** | CHEMISTRY | (PART-A) | 1 to 45 | **+4** | **-1** |

3. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.

4. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

5. Before attempting paper write your Registration Number, Name and Test Centre in the space provided at the bottom of this sheet

**Note:** Please check this Question Paper contains all **3** sections and **180** questions. If not so, exchange for the correct Question Paper

*Registration Number* : _____

*Name of the Candidate* : _____

*Test Centre* : _____

## Recommended Time: 60 Minutes for Section – I

# Section – I
# BIOLOGY – (PART – A)

*This part contains **90 Multiple Choice Questions** number **1 to 90.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1.  Cell division occurs _____ in plants and _____ in animals.
    (A) continuously, only up to a certain age   (B) only up to a certain age, continuously
    (C) continuously, never   (D) once, twice

2.  Systematics refers to the
    (A) identification and classification of plants and animals.
    (B) nomenclature and identification of plants and animals.
    (C) diversity of kinds of organisms and their relationship.
    (D) different kinds of organisms and their classification

3.  Match the common name given in column I with their taxonomic category family given in column II and choose the correct combination from the options given below.

    | Column-I (Common Name) | | Column-II (Taxonomic category– Family) | |
    | --- | --- | --- | --- |
    | A. | Man | I. | Poaceae |
    | B. | Datura | II. | Anacardiaceae |
    | C. | Mango | III. | Solanaceae |
    | D. | Wheat | IV. | Hominidae |

    (A) A – IV; B – III; C – II; D – I   (B) A – IV; B – III; C – I; D – II
    (C) A – I; B – II; C – III; D – IV   (D) A – I; B – III; C – II; D – IV

4.  ICBN refers to
    (A) Inter Coding for Botanical Nomenclature   (B) Indian Code for Botanical Nomenclature
    (C) International Code for Botanical Nomenclature   (D) International code For Biological Nomenclature

5.  Which among the following is / are belongs to the Prokaryotic organism belongs to the Kingdom Monera?
    (A) Bacteria   (B) Cyanobacteria   (C) Mycoplasma   (D) All of the above

6.  The Red Tides are due to the presence of
    (A) Gonyaulax   (B) Diatoms   (C) Euglena   (D) Slime moulds

7.  In Biosystematics, the basis of classification is
    (A) Major morphological characters
    (B) Cytological characters
    (C) Evolutionary history considering various parameters from different fi elds of studies
    (D) None of these

8.  Which statement is incorrect about viruses ?
    (A) Viruses are obligate parasites.
    (B) Viruses can multiply only when they are inside the living cells.
    (C) Viruses cannot pass through bacterial filters.
    (D) Viruses are made up of protein and DNA or RNA (never both DNA and RNA).

9.  Identify the following figures.
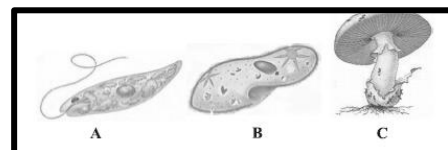
    

    (A) A – Euglena, B – Paramoecium, C – Agaricus
    (B) A – Euglena, B – Planaria, C – Agaricus
    (C) A – Planaria, B – Paramoecium, C – Agaricus
    (D) A – Euglena, B – Paramoecium, C – Aspergillus

10. Organisms which are indicator of SO2 pollution of air
    (A) Mosses              (B) Lichens          (C) Mushrooms       (D) Puffballs

11. Mycoplasma is a
    (A) eukaryotic and multicellular            (B) prokaryotic and multicellular
    (C) prokaryotic and unicellular             (D) eukaryotic and unicellular

12. Phycology is the study of
    (A) algae                (B) fungi            (C) bacteria         (D) all the above

13. Viruses belong to kingdom
    (A) monera             (B) protista           (C) fungi           (D) none of the above

14. Pteridophytes differ from mosses/bryophytes in possessing
    (A) independent gametophyte            (B) well-developed vascular system
    (C) archegonia                  (D) flagellate spermatozoids

15. What is true about male and female gametophyte in plant kingdom?
    (A) In bryophytes and pteridophytes they have independent free-living existence.
    (B) In gymnosperms and angiosperms, they have no independent free-living existence.
    (C) Both 1 and 2
    (D) In bryophytes, pteridophytes and angiosperms they have free-living life. They remain in sporangia which are retained on sporophytes.

16. Which is the correct combination?

| Column-I | | Column-II | |
|---|---|---|---|
| A. | Agar | I. | Single cell protein, use as food supplements by space travellers |
| B. | Algin | II. | Phycocolloids in red algae |
| C. | Carrageen | III. | Phycocolloids in brown algae |
| D. | Chlorella and Spirullina | IV. | Gelidium, Gracilaria |

    (A) A → I; B → II; C → III; D → IV         (B) A → IV; B → III; C → II; D → I
    (C) A → II; B → I; C → III; D → IV        (D) A → III; B → II; C → I; D → IV

17. The plant body of moss (Funaria) is
    (A) completely sporophyte              (B) completely gametophyte
    (C) predominantly sporophyte with gametophyte    (D) predominantly gametophyte with sporophyte

18. Brown algae is characterised by the presence of
    (A) phycocyanin       (B) phycoerythrin       (C) fucoxanthin       (D) carrageen

19. Which of the following is true about bryophytes?
    (A) They possess archegonia.              (B) They contain chloroplast.
    (C) They are thalloid.                   (D) All of these

20. Floridean starch is found in
    (A) chlorophyceae      (B) myxophyceae      (C) phaeophyceae      (D) Rhodophyceae

21. Sex organs in *Funaria* develop
    (A) in protonema                    (B) outside capsule
    (C) in the axil of leaf                 (D) at the tip of gametophores

22. Which one of the following statements concerning the algae is wrong ?
    (A) Most algae are photosynthetic.     (B) Algae can be classified according to their pigments.
    (C) All algae are filamentous.        (D) *Spirogyra* does not produce zoospores.

23. Mannitol is the stored food in
    (A) *Chara*           (B) *Porphyra*       (C) *Fucus*        (D) *Gracillaria*

24. Which of the following pigments is present in all algae?
    (A) Chlorophyll *a*       (B) Chlorophyll *b*       (C) Chlorophyll *c*       (D) Chlorophyll *d*

25. *Spirogyra* has a
    (A) haplontic life cycle
    (B) diplontic life cycle
    (C) haplobiontic life cycle
    (D) diplobiontic life cycle

26. Which statement is true ?
    (A) Spores and gametes are invariably diploids.
    (B) Spores and gametes are invariably haploids.
    (C) Only gametes are invariably haploids.
    (D) Only spores are invariably diploids

27. "Botanical snakes" are
    (A) algae
    (B) fungi
    (C) bryophytes
    (D) pteridophytes

28. In gymnosperms, the ovule is naked because
    (A) Ovary and ovary wall are absent.
    (B) integuments are absent
    (C) perianth is absent
    (D) nucellus is absent

29. Which among the following characters are more stable
    (A) Floral characters
    (B) Stem characters
    (C) Root characters
    (D) All of the above

30. Which of the following is correctly matched?
    (A) Man – species Homo
    (B) Mango – Family Anacardiaceae
    (C) Wheat – order Poaceae
    (D) Leopard – Genus leo

31. Each category of taxonomic hierarchy refers to as a unit of
    (A) systematic
    (B) identification
    (C) nomenclature
    (D) classification

32. Which of the following statements regarding growth is incorrect?
    (A) In plants, growth by cell division is seen only up to a certain stage.
    (B) Growth exhibited by non-living objects is by accumulation of material on the surface.
    (C) A multicellular organism grows by cell division.
    (D) Growth in in vitro culture of unicellular organisms can be observed by counting the number of cells.

33. Assertion: Information given on the label of herbarium sheets does not include family.
    Reason: Families are characterized on the basis of reproductive features of plant species only.
    (A) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
    (B) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
    (C) If Assertion is true but Reason is false.
    (D) If both Assertion and Reason are false.

34. Which of the following taxonomic category of housefly is incorrectly matched?
    (A) Genus – Musca
    (B) Family – Muscidae
    (C) Order – Primata
    (D) Class – Insecta

35. Taxon is a
    (A) unit of classification.
    (B) species.
    (C) highest rank of classification.
    (D) group of closely related organisms

36. Two plants can be conclusively said to belong to the same species if they
    (A) have same number of chromosomes.
    (B) can reproduce freely with each other and form seeds.
    (C) have more than 90 per cent similar genes.
    (D) look similar and possess identical secondary metabolites

37. Which of the following shows the more correct example of taxonomic category - Genus?
    (A) Potato, tomato and brinjal belong to the genus, Solanum
    (B) Monkey, gorilla and gibbon are placed in Mammalia.
    (C) Solanum, Petunia, and Datura are placed in Solanacea.
    (D) Mangifera indica, Solanum tuberosum, and Panthera tigris.

38. Bladderwort and Venus fly trap are examples of
    (A) insectivorous plants
    (B) parasitic plants
    (C) N2 – rich plants
    (D) aquatic plants

39. Plasmogamy is the fusion of
    (A) two haploid cells including their nuclei.
    (B) two haploid cells without nuclear fusion.
    (C) sperm and egg.
    (D) sperm and two polar nuclei

40. Yeast is not included in protozoans but are placed fungi because
    (A) it has no chlorophyll.
    (B) It has cell wall and is made up of chitin
    (C) it has eukaryotic organization.
    (D) cell wall is made up of cellulose and reserve food material is starch

41. Bacteria and yeast are similar in all the following features except that
    (A) both are unicellular.
    (B) difference in cellular organisation.
    (C) both are capable of causing fermentation.
    (D) both produce spores

42. Cytological information like chromosome number, structure, behaviour is related with
    (A) numerical taxonomy      (B) cytotaxonomy      (C) chemotaxonomy      (D) all of these

43. Cycas and Adiantum resemble each other in having
    (A) seeds      (B) motile sperms      (C) cambium      (D) vessels

44. In bryophytes, male and female sex organs are called _____ and _____ respectively.
    (A) microsporangia; macrosporangia      (B) male strobili; female strobili
    (C) antheridia; archegonia      (D) androecium; gynoecium

45. Majority of Rhodophyceae tend to grow in
    (A) marine and warmer areas      (B) marine and colder areas
    (C) freshwater and warmer areas      (D) brackish water and warmer areas

46. The organisms belonging to following phylum are (true) coelomate
    (A) Arthropoda      (B) Aschelminthes      (C) Ctenophora      (D) Platyhelminthes

47. Comb jellies belong to
    (A) Porifera      (B) Cnidaria      (C) Ctenophora      (D) Corals

48. Given below are four statements regarding Aschelminthes
    A. They are bilaterally symmetrical and triploblastic
    B. They are dioecious
    C. All are plants or animals' parasites
    D. They are acoelomate
    Mark the option that has both the incorrect statements
    (A) A, B      (B) A, C      (C) B, C      (D) C, D

49. Which of the following character is not true for cyclostomata?
    (A) Endoparasites on some fishes
    (B) Bearing 6-15 pairs of gill slits
    (C) Sucking and circular mouth without jaws
    (D) Cranium and vertebral column are cartilaginous

50. Marsupial Kangaroo is
    (A) Viviparous      (B) Oviparous      (C) Ovoviviparous      (D) A distinct category

51. Which of the following is not the characteristic feature of the phylum Arthropoda
    (A) jointed appendages      (B) Body is covered by chitinous cuticle
    (C) fertilization is external      (D) sensory organs are antennae, compound eyes.

52.  The Adult of Echinoderms are
    (A) Asymmetrical      (B) Radially symmetrical
    (C) Bilaterally symmetrical      (D) Both (B) & (C)

53. File like rasping organ is present in the mouth of molluscs are
    (A) Mantle      (B) Radula      (C) both a and b      (D) none of the above

54. Water canal system is present in
    (A) Phylum Molluscs      (B) Phylum Porifera
    (C) Phylum Arthropoda      (D) Phylum Ctenophora

55. freshwater sponge is
    (A) sycon          (B) Spongilla          (C) Euspongia          (D) none of the above

56. Complete digestive system is present in
    (A) phylum Cnidaria                    (B) Phylum Platyhelminthes
    (C) Phylum Aschelminthes               (D) Phylum ctenophora

57. Tentacles with cnidoblasts are seen in
    (A) Phylum cnidaria                    (B) phylum ctenophora
    (C) both a and b                       (D) none of the above

58. Which of the following statement is not true for Agnatha
    (A) They include hag fishes and lampreys      (B) They have notochord throughout their lives
    (C) They are known as cyclostomes             (D) They have unpaired fi ns only

59. Which of the following is a vertebrate but not a member of Tetrapoda?
    (A) Petromyzon       (B) Bat          (C) Pigeon          (D) Amphioxus

60. The teeth is heterdont, thecodont and diphydont in
    (A) Class mammalia   (B) Class Amphibia   (C) Class Reptalia   (D) Class Aves

61. In sponges, spongocoel is lined by flagellated cells known as
    (A) Choanocytes      (B) Amoebocytes      (C) Pinacocytes      (D) Archaeocytes

62. Select the phylum given below that includes both marine and fresh water species
    (A) Mollusca         (B) Echinoderms      (C) Ctenophora      (D) Platyhelminthes

63. Identify the group, that includes animals, all of which give birth to young ones directly
    (A) Dolphin, Kangroo, Bat and cat
    (B) Platypus, Penguin, Bat and Hippopotamus
    (C) Shew, Bat, Kiwi and Honey Bee
    (D) Lion, Whale, Ostrich and Bat

64. In which one of the following organisms its respiratory organs are correctly matched?
    (A) Starfish – Phayngeal Gills         (B) King Crab – Book gills
    (C) Cuttle fish – Book lungs           (D) Earthworm – Lungs

65. When any plane passing through the central axis of the body divides the organism into two identical halves, the organism is called _____.
    (A) radially symmetrical               (B) bilaterally symmetrical
    (C) asymmetrical                       (D) metamerically segmented

66. Parapodia for locomotion are found in one of the following
    (A) Earthworm        (B) Hirudinaria      (C) Nereis          (D) Polygordius

67. In ctenophora, the body bears _____ external rows of ciliated comb plates, which help in locomotion.
    (A) five             (B) six              (C) seven           (D) eight

68. _____ is responsible for maintaining the current of water in sponge.
    (A) Osculum          (B) Porocytes        (C) Spongocoel      (D) Choanocytes

69. Different types of respiratory organs like gills, book gills, trachea, book lungs are seen in the phylum
    (A) Arthropoda       (B) Annelida         (C) Mollusca        (D) Echinodermata

70. In which of the phylum, excretory organ like proboscis gland is present?
    (A) Hemichordata     (B) Chordata         (C) Echinodermata   (D) Annelida

71. Which of the following pairs of animals comprises 'jawless fishes?
    (A) Mackerals and rohu                 (B) Lampreys and hag fishes
    (C) Guppies and hag fishes             (D) Lampreys and eels

72. In amphibians, heart is generally _____ chambered.
    (A) two              (B) three            (C) four            (D) none of these

73. Which of the following is a chordate feature and not shared by the non-chordates ?
    (A) Metamerism
    (B) Axial organization
    (C) Bilateral symmetry
    (D) Pharyngeal gill slits

74. Which one of the following statement regarding coelom of given animals is correct?
    (A) Round worms (aschelminthes) are pseudocoelomates.
    (B) Molluscs are acoelomates.
    (C) Insects are pseudocoelomates.
    (D) Flatworms (platyhelminthes) are coelomates

75. Assertion : Tapeworm, roundworm and pinworm are endoparasites of human intestine.
    Reason : Improperly cooked food is the source of intestinal infections.
    (A) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
    (B) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
    (C) If Assertion is true but Reason is false.
    (D) If both Assertion and Reason are false.

76. The given figures (A & B) shows the germinal layer.
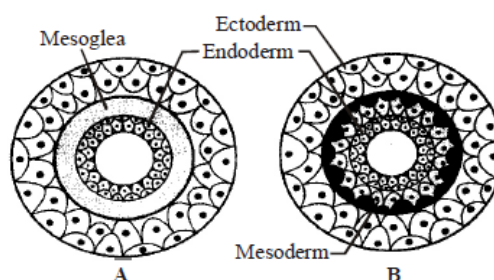


    The animals having structures shown in the figures are respectively called

    (A) diploblastic, triploblastic
    (B) triploblastic, diploblastic
    (C) diploblastic, diploblastic
    (D) triploblastic, triploblastic

77. Which of the following traits is not shared by both sea anemones and jellyfish?
    (A) A medusa as the dominant stage in the life cycle.
    (B) Possession of a gastro vascular cavity.
    (C) Sexual reproduction.
    (D) Nematocysts present on the tentacles.

78. Echidna and platypus are
    (A) viviparous
    (B) Oviparous
    (C) ovo-viviparous
    (D) non of the above

79. Which of the following is a non poisonous snakes
    (A) python
    (B) Naja
    (C) Bangarus
    (D) Vipera

80. Organ level of organization is found in
    (A) Spongilla
    (B) Pleurobrachia
    (C) Taenia
    (D) Obelia

81. Which among the following organism is having sedentary nature?
    (A) Periplanata
    (B) Hydra
    (C) Birds
    (D) Snakes

82. Tympanum of frog represents
    (A) eye
    (B) ear
    (C) nose
    (D) mouth

83. Digestion in cnidarians is
    (A) Extracellular
    (B) Intracellular
    (C) Both A and B
    (D) None of these

84. Which among the following is a jaw less ?
    (A) Cyclostomata
    (B) Chondricthyes
    (C) ondricthyes
    (D) Mammals

85. Distinguishing character of hemichordate is
    (A) Open circulatory system
    (B) Excretory organ is proboscis gland
    (C) They are dioecious
    (D) All of the above

86. In Osteichthyes group
    (A) Fertilization is internal
    (B) Placoid scales are more
    (C) Gill cover is found
    (D) Air bladder is absent

87. Which of the following does not have a limbs
    (A) Mammals
    (B) reptiles
    (C) Aves
    (D) chondrichthyes

88. Branchiostoma is a
    (A) lancelet
    (B) Balanoglossus
    (C) Saccoglossus
    (D) Doliolum

89. Which of the following is the flightless bird?
    (A) Pigeon
    (B) Ostrich
    (C) Crow
    (D) Peacock

90. Limbless amphibian is
    (A) Frog
    (B) Tree frog
    (C) Ichthyophis
    (D) Bufo

# Recommended Time: 60 Minutes for Section – II

# Section – II

# PHYSICS – (PART – A)

*This part contains 45 **Multiple Choice Questions** number **1 to 45.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1. Two vectors are given as $\vec{A} = 2\hat{i} - 3\hat{j} - \hat{k}$ and $\vec{B} = -6\hat{i} + 9\hat{j} + 3\hat{k}$. The value of $\vec{A} \times \vec{B}$ is
   (A) $18\hat{i} - 12\hat{j} + 36\hat{k}$
   (B) $18\hat{i} - 12\hat{j} - 36\hat{k}$
   (C) $6\hat{i} - 3\hat{j} + 2\hat{k}$
   (D) Zero

2. Each side of a cube is measured to be 6.372 m. The total surface area of cube with appropriate significant figures is
   (A) 243.614304 $m^2$
   (B) 243.6 $m^2$
   (C) $2 \times 10^2 m^2$
   (D) $2.5 \times 10^2 m^2$

3. Choose the **correct** statement
   (A) A dimensionally correct equation need not to be an actually correct equation
   (B) A dimensionally correct equation may be an actually correct equation.
   (C) A dimensionally incorrect equation may be correct
   (D) Both A and B

4. Two bodies of masses 3 kg and 4 kg are tied to the ends of a massless string. The string passes over a frictionless pulley. If $g = 10 \text{ ms}^{-2}$, the tension in the string is
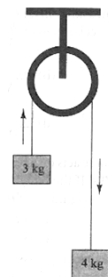
   

   (A) $\dfrac{120}{7}$N
   (B) $\dfrac{240}{7}$N
   (C) $\dfrac{280}{7}$N
   (D) $\dfrac{320}{7}$N

5. A projectile is projected with initial velocity $(10\hat{i} + 20\hat{j})$m/s from the ground. The velocity of the body just before hitting the ground is
   (A) $10\hat{i} + 20\hat{j}$
   (B) $-10\hat{i} + 20\hat{j}$
   (C) $10\hat{i} - 20\hat{j}$
   (D) $-10\hat{i} - 20\hat{j}$

6. The component of $(3\hat{i}+4\hat{j})$ in the direction of $(\hat{i}-\hat{j})$ is

   (A) $\dfrac{\hat{j}-\hat{i}}{2}$
   (B) $\dfrac{\hat{i}-\hat{j}}{\sqrt{2}}$
   (C) $\dfrac{7}{\sqrt{2}}(\hat{i}-\hat{j})$
   (D) $\dfrac{7}{\sqrt{2}}(\hat{j}-\hat{i})$

7. A man can swim with a speed of 5 km/h in still water. How long does he take to cross a river 1.0 km wide by shortest path, if the river is flowing steadily at 4 km/h
   (A) 20 min
   (B) 30 min
   (C) 12 min
   (D) 15 min

8. A ball is thrown vertically upwards with a velocity of 20 m/s from the top of 160 m high building. The time taken by ball to hit the ground is ( $g = 10\,\text{m/s}^2$ )
   (A) 8 s
   (B) 10 s
   (C) 12 s
   (D) 6 s

9. The area under 'force displacement' curve gives
   (A) Momentum
   (B) work
   (C) Power
   (D) Impulse

10. A bob of mass m is suspended by a light string of length I. It is imparted a horizontal velocity $V_0$ at the lowest point A, such that it just completes the vertical circle. The kinetic energy of the bob at position B as shown in the figure will be
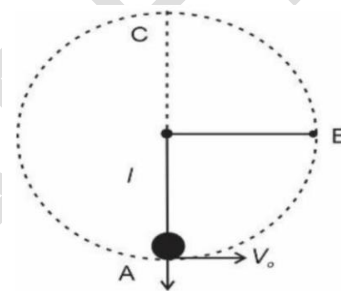


   (A) $\dfrac{5}{2}mgl$
   (B) $mgl$
   (C) $\dfrac{3}{2}mgl$
   (D) $2\,mgl$

11. A block of mass m moving with velocity $V_0$ on a smooth horizontal surface collide with an ideal spring having spring constant k attached with a wall as shown in figure. The maximum compression in the spring will be
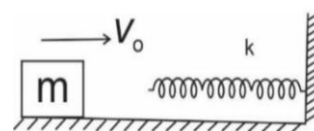


   (A) $V_0\sqrt{\dfrac{m}{2K}}$
   (B) $V_0\sqrt{\dfrac{m}{K}}$
   (C) $\dfrac{V_0}{2}\sqrt{\dfrac{m}{K}}$
   (D) $V_0\sqrt{\dfrac{2m}{K}}$

12. A car is moving on the banked rough road inclined at an angle $\theta$ with the speed $v_0 = \sqrt{R\,g\tan\theta}$ (where R is the radius of curvature of the road). If speed of the car becomes $v < v_0$. Then friction force on the car will
    (A) Act down to the slope
    (B) Act up to the slope
    (C) Not act
    (D) Act down to slope or up to the slope depends on the mass of the car

13. A monkey of mass 30 kg climbs up on a light rope as shwon in figure. If breaking strength of the rope is 400 N, then maximum acceleration of the monkey will be
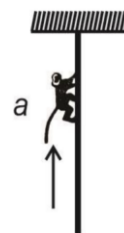


   (A) $5\,\text{m/s}^2$
   (B) $\dfrac{10}{3}\,\text{m/s}^2$
   (C) $20\,\text{m/s}^2$
   (D) Zero

14. The co-ordinates of a moving particle at any time 't' are given by $x = \alpha t^3$ and $y = \beta t^3$. The speed of the particle at time 't' is given by

    (A) $3t\sqrt{\alpha^2 + \beta^2}$
    (B) $3t^2\sqrt{\alpha^2 + \beta^2}$
    (C) $t^2\sqrt{\alpha^2 + \beta^2}$
    (D) $\sqrt{\alpha^2 + \beta^2}$

15. A car, moving with a speed of 50 km/hr, can be stopped by brakes after at least 6 m. If the same car is moving at a speed of 100 km/hr, the minimum stopping distance is
    (A) 12 m
    (B) 18 m
    (C) 24 m
    (D) 6 m

16. The range of a particle when launched at an angle of 15° with the horizontal is 1.5 km. What is the range of the projectile when launched at an angle of 45° to the horizontal.
    (A) 1.5 km
    (B) 3.0 km
    (C) 6.0 km
    (D) 0.75 km

17. The coefficient of static friction between the box and the train's floor is 0.2. The maximum acceleration of the train in which a box lying on its floor will remain stationary is (Take $g = 10\ \text{ms}^{-2}$)

    (A) $2\ \text{m s}^{-2}$
    (B) $4\ \text{m s}^{-2}$
    (C) $6\ \text{m s}^{-2}$
    (D) $8\ \text{m s}^{-2}$

18. If $a_R$ and $a_t$ represent radial and tangential accelerations, then the motion of particle will be uniformly circular for:
    (A) $a_R = 0, a_t = 0$
    (B) $a_R = 0, a_t \neq 0$
    (C) $a_R \neq 0, a_t = 0$
    (D) $a_R \neq 0, a_t \neq 0$

19. The acceleration a of a particle starting from rest varies with time according to relation: $a = \alpha t + \beta$. The velocity of the particle after a time t will be:

    (A) $\dfrac{\alpha t^2}{2} + \beta$
    (B) $\dfrac{\alpha t^2}{2} + \beta t$
    (C) $\alpha t^2 + \dfrac{1}{2}\beta t$
    (D) $\dfrac{(\alpha t^2 + \beta)}{2}$

20. A particle is projected from a horizontal plane with a velocity of $8\sqrt{2}\ \text{m/s}$ at an angle. At the highest point, its velocity is found to be 8 m/s. Its range will be:
    (A) 6.4 m
    (B) 3.2 m
    (C) 12.8 m
    (D) 4.6 m

21. Two blocks of 2 kg and 1 kg are in contact on a frictionless table. If a force of 3 N is applied on 2 kg block, then the force of contact between the two blocks is
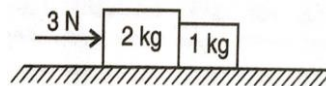
    

    (A) 0 N
    (B) 1 N
    (C) 2 N
    (D) 3 N

22. The coefficient of friction between the tyres and the road is 0.25. The maximum speed with which car can be driven round a curve of radius 40 m without skidding is : (assume $g = 10\ \text{ms}^{-2}$)

    (A) $40\ \text{ms}^{-1}$
    (B) $20\ \text{ms}^{-1}$
    (C) $15\ \text{ms}^{-1}$
    (D) $10\ \text{ms}^{-1}$

23. How many 2.5 kg bricks can a man carry up a staircase 3.6 m high in one hour if he works at the average rate of 9.8 watt?
    (A) 800
    (B) 200
    (C) 600
    (D) 400

24. The speed $\upsilon$ reached by a car of mass m, driven with constant power P, is given by:

    (A) $\upsilon = \dfrac{2xP}{m}$
    (B) $\left[\dfrac{2xP}{m}\right]^{1/2}$
    (C) $\upsilon = \left(\dfrac{3xP}{m}\right)^{1/3}$
    (D) $\upsilon = \left(\dfrac{3xP}{m}\right)^2$

25. The coefficient of static friction between two blocks placed on a smooth table (as shown in figure) is $\mu$. What maximum horizontal force F can be applied on the lower block, so that the two block move together?
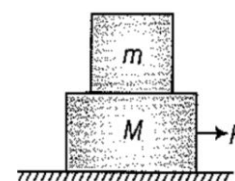
    

    (A) $\mu m g$
    (B) $\mu M g$
    (C) $(M + m)\mu g$
    (D) $\dfrac{M}{m}\mu g$

26. One end of a spring of natural length h and spring constant k is fixed at the ground and the other is fitted with smooth ring of mass m which is allowed to slide on a horizontal rod fixed at a height h (see the figure). Initially the spring makes an angle of 37° with the vertical when the system is released from rest. The speed of the ring when the spring becomes vertical is
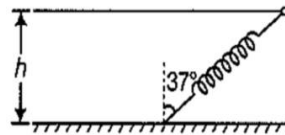
    (A) $\dfrac{h}{2}\sqrt{\dfrac{k}{m}}$

    (B) $\dfrac{h}{4}\sqrt{\dfrac{k}{m}}$

    (C) $\dfrac{h}{2}\sqrt{\dfrac{k}{2m}}$

    (D) $\dfrac{h}{4}\sqrt{\dfrac{k}{2m}}$

27. A body is thrown vertically up with a velocity u. It passes three points A,B and C in its upward journey with velocities $\dfrac{u}{2},\dfrac{u}{3}$ and $\dfrac{u}{4}$ respectively. The ratio of AB and BC is

    (A) 20 : 7        (B) 2        (C) 10 : 7        (D) 1

28. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. If the turbine has an efficiency of 90%, how much power is generated by the turbine?( $g = 10\,m/s^2$ )

    (A) 8.1 kW        (B) 10.2kW        (C) 12.3kW        (D) 7.0kW

29. A stone is tied to a string of length $\ell$ and is going around in a vertical circle with the other end of the string at the centre. At a certain instant of time, the stone is at its lowest position and has a speed u. The magnitude of the change in velocity as it reaches a position where the string is horizontal (g being acceleration due to gravity) is

    (A) $\sqrt{2g\ell}$        (B) $\sqrt{2(u^2 - g\ell)}$        (C) $\sqrt{u^2 - g\ell}$        (D) $u - \sqrt{u^2 - 2g\ell}$

30. A vehicle is moving on a track with constant speed as shown in figure. The apparent weight of the vehicle is
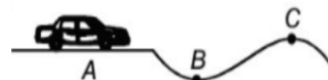
    (A) Maximum at A        (B) Maximum at B        (C) Maximum at C        (D) Same at A,B and C

31. Ratio of maximum to minimum tension in vertical circular motion is 3, then find maximum tension in vertical circular path if mass of object is 'm'.

    (A) 4 mg        (B) $\dfrac{4\,mg}{3}$        (C) $\dfrac{3\,mg}{4}$        (D) 9 mg

32. A block of mass of 1 kg slides down a curved track that is one quadrant of circle of radius 1 m. Its speed at the bottom in 2 m/s. the work done by the frictional force is : ( $g = 10\,m/s^2$ )
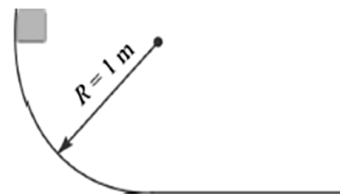
    (A) 8 J        (B) -8 J        (C) 4 J        (D) -4 J

33. A simple pendulum of length $\ell$ is oscillating with amplitude $\theta$. At some instant it makes angle $\theta$ with the vertical, its speed of the bob is v. The acceleration of bob will be
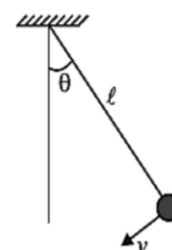
    (A) g sin $\theta$        (B) g tan $\theta$        (C) $\sqrt{(g\sin\theta)^2 + \left(\dfrac{v^2}{\ell}\right)^2}$        (D) $\dfrac{v^2}{\ell}$

34. Which of the following is a vector quantity?
    (A) Work done          (B) Power          (C) Energy          (D) None of the above

35. The Range of a projectile launched from ground is R on the surface of the earth. For the same initial velocity and angle of projection, on a planet where g is one fourth of that on earth, the range will be
    (A) $\dfrac{R}{4}$          (B) 4R          (C) $\dfrac{R}{16}$          (D) 16 R

36. Consider a body projected at a speed of 10 m/s at an angle 37° with the vertical. What will be the magnitude of its average velocity during its entire Journey? (Take $g = 10\,m/s^2$, $\tan 37° = \dfrac{3}{4}$ )
    (A) 10 m/s          (B) 8 m/s          (C) 6 m/s          (D) Zero

37. For three particles A,B,C having masses in the ratio 3 : 2 : 1, when released from heights h,2h,3h. Find the ratio of their kinetic energies when they reach the ground ( Neglect air resistance)
    (A) 1 : 1 :1          (B) 1 : 2 : 3          (C) 3 : 2 : 1          (D) 3 : 4 : 3

38. If a spring of spring constant k is changed from a state of compression $x_0$ to a state of extension of $x_0$, Find the change in the potential energy of the spring.
    (A) $\dfrac{1}{2}Kx_0^2$          (B) $-\dfrac{1}{2}Kx_0^2$          (C) Zero          (D) $-Kx_0^2$

39. Consider a river of width 10 m. A swimmer, who can swim at a speed of 4 m/s in still water, wishes to cross the river in the shortest possible time. If the speed of the river is 3m/s, find the drift of the swimmer along the river.
    (A) 7.5 m          (B) 13.3 m          (C) 10 m          (D) 0 m

40. Consider a particle going in a straight line for a total time of 3 hours. The particle travels with a constant speed of 50 km/h for the first 2 hours. Then it uniformly decelerates to come to rest at the end of its Journey. Find the average speed of the particle in the entire journey
    (A) $\dfrac{100}{3}\,km/h$          (B) $50\,km/h$          (C) $\dfrac{125}{3}\,km/h$          (D) Data Insufficient

41. Consider a body moving in xy plane such that $x = 5t^2 + 5, y = 2t$. Find the equation of its trajectory.
    (A) $x = \dfrac{5y^2}{4} + 5$          (B) $x = \dfrac{4}{5}y^2 + y$          (C) $y = \dfrac{5}{4}x^2 + 5$          (D) $y = \dfrac{4}{5}x^2 + x$

42. A bullet strikes a plank on one side and it comes out of it on the other side with 70% of its initial velocity. How many such planks are needed to stop the bullet?
    (A) 2          (B) 3          (C) 4          (D) 5

43. Which of the following forces is a conservative force
    (A) Viscous Force          (B) Electrostatic Force
    (C) Gravitational Force          (D) Both B and C

44. Which of the following is NOT a fundamental force
    (A) Gravitational Force          (B) Weak Nuclear Force
    (C) Centripetal Force          (D) Electromagnetic Force

45. Which of the following is not an SI unit?
    (A) Joule (J)          (B) Watts (W)          (C) Ergs          (D) Pascal (Pa)

# Recommended Time: 60 Minutes for Section – III

# Section – III

# CHEMISTRY – (PART – A)

*This part contains **45 Multiple Choice Questions** number 1 **to 45**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1. Which of the following pairs of substances illustrate the law of multiple proportions
   (A) $CO$ and $CO_2$
   (B) $H_2O$ and $D_2O$
   (C) $NaCl$ and $NaBr$
   (D) $MgO$ and $Mg(OH)_2$

2. In the reaction $2Na_2S_2O_3 + I_2 \rightarrow N_2S_4O_6 + 2NaI$, the equivalent weight of $Na_2S_2O_3$ (mol.wt = M) is equal to
   (A) M
   (B) M/2
   (C) M/3
   (D) M/4

3. Which of the following set of quantum numbers is permissible
   (A) n = 3; l = 2; m = 2 and $s = +\dfrac{1}{2}$
   (B) n = 3; l = 4; m = 0 and $s = -\dfrac{1}{2}$
   (C) n = 4; l = 0; m = 2; and $s = +\dfrac{1}{2}$
   (D) n = 4; l = 4; m = 3; and $s = +\dfrac{1}{2}$

4. Highest covalent character is found in which of the following?
   (A) $CaF_2$
   (B) $CaCl_2$
   (C) $CaI_2$
   (D) $CaBr_2$

5. The species having octahedral shape is
   (A) $SF_6$
   (B) $BF_4^-$
   (C) $PCl_5$
   (D) $BO_3^{3-}$

6. The hybridization of carbon in diamond, graphite and acetylene is
   (A) $sp^3, sp^2, sp$
   (B) $sp^3, sp, sp^2$
   (C) $sp^2, sp^3, sp$
   (D) $sp, sp^3, sp^2$

7. The structure of $ICl_2^-$ is:
   (A) Trigonal
   (B) Octahedral
   (C) Square planar
   (D) Linear

8. The internuclear distance in $H_2$ and $Cl_2$ molecules are 74 and 198 pm respectively. The bond length of HCl may be
   (A) 272 pm
   (B) 70 pm
   (C) 136 pm
   (D) 248 pm

9. In the 6$^{th}$ period of periodic table 14 elements are placed in the group-3 of the period. These are known as
   (A) Alkali metals
   (B) Alkaline earth metals
   (C) Rare gases
   (D) Rare earths

10. Eka-aluminium and Eka-silicon are known as
    (A) Gallium and germanium
    (B) Aluminium and silicon
    (C) Iron and sulphur
    (D) Proton and silicon

11. The electronic configuration of the element with maximum electron affinity is
    (A) $1s^2, 2s^2 2p^3$
    (B) $1s^2, 2s^2 2p^5$
    (C) $1s^2, 2s^2 2p^6, 3s^2 3p^5$
    (D) $1s^2, 2s^2 2p^6, 3s^2 3p^6$

12. Which of the following ionic radius would be maximum?
    (A) $C^{4-}$
    (B) $N^{3-}$
    (C) $O^{2-}$
    (D) $Mg^{2+}$

13. Which p-orbitals overlapping would give the strongest bond?

(A) 

(B) 

(C) 

(D) 
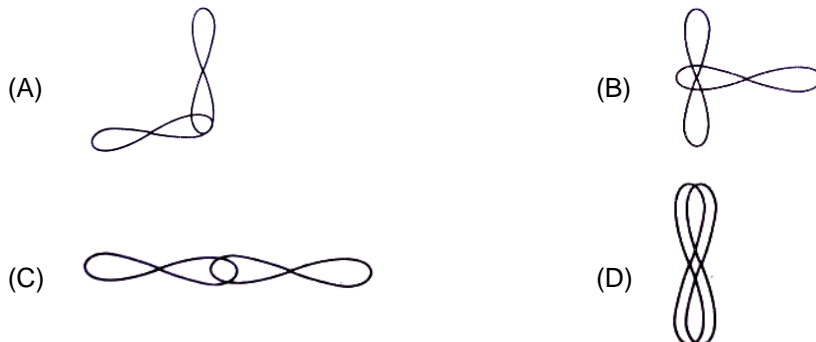
14. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ions in acidic solution is
(A) 2/5          (B) 3/5          (C) 4/5          (D) 1

15. A compound of Vandium has magnetic moment of 1.73 BM. The electronic configuration of Vanadium ion in the compound
(A) $[Ar]3d^1$      (B) $[Ar]3d^2$      (C) $[Ar]3d^3$      (D) $[Ar]3d^0$

16. The number of nodal planes in $P_x$ orbital is
(A) One      (B) Two      (C) Three      (D) Zero

17. The uncertainty in the momentum of an electron is $10^{-5}\ kg\,ms^{-1}$. The uncertainty in it's position is ___
(A) $1.05 \times 10^{-28}\,m$      (B) $1.05 \times 10^{-26}\,m$      (C) $5.27 \times 10^{-30}\,m$      (D) $5.25 \times 10^{-28}\,m$

18. The third line in Balmer series corresponds to an electronic transition between which Bohr's orbits in hydrogen
(A) $5 \to 3$      (B) $5 \to 2$      (C) $4 \to 3$      (D) $4 \to 2$

19. Which quantum number is not related with Schrodinger equation
(A) Principal      (B) Azimuthal      (C) Magnetic      (D) Spin

20. The electrons identified by quantum numbers n and l:
(a) n = 4, l = 1      (b) n = 4, l = 0      (c) n = 3, l = 2      (d) n = 3 = l = 1
Can be placed in order of increasing energy as
(A) (b) < (d) < (a) < (c)          (B) (a) < (c) < (b) < (d)
(C) (c) < (d) < (b) < (a)          (D) (d) < (b) < (c) < (a)

21. Calculate the weight of lime (CaO) obtained by heating 200 kg of 95% pure lime stone $\left(CaCO_3\right)$
(A) 104.4 kg      (B) 105.4 kg      (C) 212.8 kg      (D) 106.4 kg

22. If an ideal gas at 1 atmospheric pressure is expanding from $20cm^3$ to $50cm^3$ at constant temperature, then find the final pressure
(A) 0.4 atm      (B) 2.5 atm      (C) 5 atm      (D) None of these

23. If $V_0$ is the volume of a given mass of gas at 273 K at constant pressure, then according to Charles law, the volume at 10°C will be
(A) $10\,V_0$      (B) $\dfrac{1}{273}\left(V_0 + 10\right)$      (C) $V_0 + \dfrac{10}{273}$      (D) $\dfrac{283}{273}V_0$

24. The compressibility factor of real gas is usually greater than one (Z > 1) at high temperature and high pressure. This is because
(A) The constant a is negligible while b is not      (B) The constant b is negligible while a is not
(C) Both and b are negligible      (D) Both a and b are no negligible

25. The temperature at which real gases obey the ideal gas laws over a wide range of pressure is called
    (A) Critical temperature
    (B) Boyle's temperature
    (C) Inversion temperature
    (D) Reduced temperature

26. 50 mL of each of gas 'A' and 'B' takes 150 and 200 seconds respectively to effuse through a pin hole under identical conditions. If the mole weight of 'A' is 36, the mole weight of 'B' will be
    (A) 32
    (B) 96
    (C) 64
    (D) 126

27. Temperature at which most probable speed of $O_2$ becomes equal to root mean square velocity of $N_2$ at $427°C$ is
    (A) 732 K
    (B) 1200°C
    (C) 1200 K
    (D) 732°C

28. Which of the following regarding kinetic energy is true?
    (A) All object moves with the same velocity have same kinetic energy
    (B) Kinetic energy of the body will quadruple if its velocity doubles
    (C) As the velocity of object increases its kinetic energy decreases
    (D) Kinetic energy of a body is independent of its mass

29. What will be the value of x, y and z in the following equation
    $$xI_2 + yOH^- \rightarrow IO_3^- + zI^- + 3H_2O$$
    (A) 3, 5, 6
    (B) 5, 6, 3
    (C) 3, 6, 5
    (D) 6, 3, 5

30. In acting as a reducing agent, a piece of metal M weighing 16 grams gives up $2.25 \times 10^{23}$ electrons, what is the equivalent weight of the metal
    (A) 42.83
    (B) 21.33
    (C) 83.32
    (D) 32

31. The number of moles of oxalate ions oxidized by one mole of $MnO_4^-$ ion in acidic medium
    (A) $\dfrac{5}{2}$
    (B) $\dfrac{2}{5}$
    (C) $\dfrac{3}{5}$
    (D) $\dfrac{5}{3}$

32. The oxidation state of Cr in $CrO_5, K_2Cr_2O_7$ and $Cr_2(SO_4)_3$ respectively are
    (A) 10, 6, 3
    (B) 6, 6, 6
    (C) 5, 6, 3
    (D) 6, 6, 3

33. 3.68g of a mixture of $CaCO_3$ and $MgCO_3$ is heated to liberate 0.04 mole of $CO_2$. The mole % of $CaCO_3$ and $MgCO_3$ in the mixture is respectively
    (A) 50%, 50%
    (B) 60%, 40%
    (C) 40%, 60%
    (D) 30%, 70%

34. Which of the following does not undergo disproportionation?
    (A) $ClO^-$
    (B) $ClO_2^-$
    (C) $ClO_3^-$
    (D) $ClO_4^-$

35. The correct order of C – O bond length among $CO, CO_3^{2-}, CO_2$ is
    (A) $CO_3^{2-} < CO_2 < CO$
    (B) $CO_2 < CO_3^{2-} < CO$
    (C) $CO < CO_2 < CO_3^{2-}$
    (D) $< CO < CO_2 < CO_3^{2-}$

36. An element X has the following isotopic composition
    $^{200}X : 90\%$
    $^{199}X : 8.0\%$
    $^{202}X : 2.0\%$
    The weighted average atomic mass of the naturally occurring element X is closest to
    (A) 199 a.m.u
    (B) 200 a.m.u
    (C) 201 a.m.u
    (D) 202 a.m.u

37. A 4P orbital has
    (A) Two radial nodes
    (B) Two spherical node and one angular node
    (C) Two angular node
    (D) Two spherical and two angular node

38. On the Pauling's electronegativity scale, which element is next to F
    (A) Cl
    (B) O
    (C) Br
    (D) Ne

39. Which does not have the hydrogen bond?
    (A) Phenol                    (B) Liquid $NH_3$              (C) Water                    (D) Liquid HCl

40. Second electron affinity of an element is
    (A) Always exothermic                              (B) Endothermic for few elements
    (C) Exothermic for few elements                   (D) Always endothermic

41. The correct order of increasing atomic size of elements N, F, Si & P.
    (A) N < F < Si < P            (B) F > N < P < Si            (C) F < N < P < Si          (D) F < N < Si < P

42. The root mean square speed of $N_2$ molecules in a sample at temperature T is 'x'. If the temperature is doubled, then nitrogen molecules dissociate into atoms, the root mean square speed of nitrogen atoms becomes
    (A) x                         (B) 2x                        (C) 4x                      (D) 14x

43. Density of Ne gas is maximum at
    (A) 2 atm, 273°C              (B) 1 atm, 0°C                (C) 4 atm, 819 K            (D) 3 atm, 819 K

44. A cricket ball of 0.5 kg is moving with a velocity of 100 ms$^{-1}$. The wavelength associated with its motion is
    (A) 1/100 cm                  (B) $66 \times 10^{-34}$ m    (C) $1.32 \times 10^{-35}$ m (D) $6.6 \times 10^{-28}$ m

45. In what ratio by mass carbon monoxide and nitrogen should be mixed so that partial pressure exerted by each is same
    (A) 1 : 1                     (B) 1 : 2                     (C) 2 : 1                   (D) 3 : 4

# BBE MEDICAL - CLASS – XI (in AY 22-23) – Paper-2 - Answer key

## Section – I BIOLOGY – (PART – A)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.A | 2.C | 3.A | 4.C | 5.D | 6.A | 7.C | 8.C | 9.A | 10.B |
| 11.C | 12.A | 13.D | 14.B | 15.C | 16.B | 17. D | 18.C | 19.D | 20.D |
| 21.D | 22.C | 23.C | 24.A | 25.A | 26.B | 27.D | 28.A | 29.A | 30.B |
| 31.D | 32.A | 33.D | 34.C | 35.A | 36.B | 37.A | 38.A | 39.B | 40.B |
| 41.B | 42.B | 43.B | 44.C | 45.A | 46.A | 47.C | 48.D | 49.A | 50.A |
| 51.C | 52.B | 53.B | 54.B | 55.B | 56.C | 57.A | 58.B | 59.A | 60.A |
| 61.A | 62.A | 63.A | 64.B | 65.A | 66.C | 67.D | 68.D | 69.A | 70.A |
| 71.B | 72.B | 73.D | 74.A | 75.B | 76.A | 77.A | 78.B | 79.A | 80.C |
| 81.B | 82.B | 83.C | 84.A | 85.D | 86.C | 87.D | 88.A | 89.B | 90.C |

## Section-II PHYSICS PART - A

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. D | 2.B | 3.D | 4.B | 5.C | 6.A | 7.A | 8.A | 9.B | 10.C |
| 11.B | 12.B | 13.B | 14.B | 15.A | 16.B | 17.A | 18.C | 19.B | 20.C |
| 21.B | 22.D | 23.D | 24.C | 25.C | 26.B | 27.A | 28.A | 29.B | 30.B |
| 31.D | 32.B | 33.C | 34.D | 35.B | 36.C | 37.D | 38.C | 39.A | 40.C |
| 41.A | 42.A | 43.D | 44.C | 45.C | | | | | |

## Section – III CHEMISTRY – (PART – A)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.A | 2.A | 3.A | 4.C | 5.A | 6.A | 7.D | 8.C | 9.D | 10.A |
| 11.D | 12.A | 13.C | 14.A | 15.A | 16.A | 17.C | 18.B | 19.D | 20.A |
| 21.D | 22.A | 23.D | 24.A | 25.B | 26.C | 27.C | 28.B | 29.C | 30.A |
| 31.A | 32.D | 33.A | 34.D | 35.C | 36.B | 37.B | 38.B | 39.D | 40.D |
| 41.C | 42.B | 43.C | 44.C | 45.A | | | | | |