

6312807

Test Booklet No. ENGLISH

Test Booklet Code

S3

GRIDU

This Booklet contains 32 pages, including Rough Page. Do not open this Test Booklet until you are asked to do so.

Important Instructions:

- The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on ORIGINAL Copy carefully with blue/black ball point pen only.
- The test is of 3 hours 20 minutes duration and the Test Booklet contains 200 multiple-choice questions (four options with a single correct answer) from Physics, Chemistry and Biology (Botany and Zoology). 50 questions in each subject are divided into two Sections (A and B) as per details given below:
 - Section A shall consist of 35 (Thirty-five) Questions in each subject (Question Nos - 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.
 - Section B shall consist of 15 (Fifteen) questions in each subject (Question Nos - 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In Section B, a candidate needs to attempt any 10 (Ten) questions out of 15 (Fifteen) in each subject.

Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, the first ten questions answered by the candidate shall be evaluated.

- Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
- Use Blue/Black Ball Point Pen only for writing particulars on this page/markings responses on Answer Sheet.
- Rough work is to be done in the space provided for this purpose in the Test Booklet only.
- On completion of the test, the candidate must hand over the Answer Sheet (ORIGINAL and OFFICE Copy) to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
- The CODE for this Booklet is S3. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
- The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
- Use of white fluid for correction is NOT permissible on the Answer Sheet.
- Each candidate must show on-demand his/her Admit Card to the Invigilator.
- No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
- The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign (with time) the Attendance Sheet twice. Cases, where a candidate has not signed the Attendance Sheet second time, will be deemed not to have handed over the Answer Sheet and dealt with as an Unfair Means case.
- Use of Electronic/Manual Calculator is prohibited.
- The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Room/Hall. All cases of unfair means will be dealt with as per the Rules and Regulations of this examination.
- No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
- The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
- Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of Scribe or not.

Name of the Candidate (in Capitals): RAJ SINGH

Roll Number: In figures 4404030591

: In words Four four zero four zero Three zero five Nine one

Centre of Examination (in Capitals): KENDRIYA VIDYALYA GHAZIABAD

Candidate's Signature: Raj

Invigilator's Signature: [Signature]

Facsimile signature stamp of Centre Superintendent

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[Signature]

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196 Match List I with List II :

List I	List II
A. RNA polymerase III	I. snRNPs
B. Termination of transcription	II. Promotor
C. Splicing of Exons	III. Rho factor
D. TATA box	IV. SnRNAs, tRNA

Choose the correct answer from the options given below :

- (1) A-IV, B-III, C-I, D-II
- (2) A-II, B-IV, C-I, D-III
- (3) A-III, B-II, C-IV, D-I
- (4) A-III, B-IV, C-I, D-II

197 Match List I with List II :

List I	List II
A. Exophthalmic goiter	I. Excess secretion of cortisol, moon face & hyperglycemia
B. Acromegaly	II. Hypo-secretion of thyroid hormone and stunted growth.
C. Cushing's syndrome	III. Hyper secretion of thyroid hormone & protruding eye balls.
D. Cretinism	IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below :

- (1) A-III, B-IV, C-I, D-II
- (2) A-I, B-III, C-II, D-IV
- (3) A-IV, B-II, C-I, D-III
- (4) A-III, B-IV, C-II, D-I

SS English]

198 Choose the correct statement given below regarding juxta medullary nephron.

- (1) Juxta medullary nephrons outnumber the cortical nephrons.
- (2) Juxta medullary nephrons are located in the columns of Bertini.
- (3) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.
- (4) Loop of Henle of juxta medullary nephron runs deep into medulla.

199 Given below are two statements :

Statement I : The cerebral hemispheres are connected by nerve tract known as corpus callosum.

Statement II : The brain stem consists of the medulla oblongata, pons and cerebrum.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Statement I is incorrect but Statement II is correct.
- (2) Both Statement I and Statement II are correct.
- (3) Both Statement I and Statement II are incorrect.
- (4) Statement I is correct but Statement II is incorrect.

200 Given below are two statements :

Statement I : Mitochondria and chloroplasts are both double membrane bound organelles.

Statement II : Inner membrane of mitochondria is relatively less permeable, as compared to chloroplast.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Statement I is incorrect but Statement II is correct.
- (2) Both Statement I and Statement II are correct.
- (3) Both Statement I and Statement II are incorrect.
- (4) Statement I is correct but Statement II is incorrect.

Zoology : Section-B (Q. No. 186 to 200)

186 As per ABO blood grouping system, the blood group of father is B⁺, mother is A⁺ and child is O⁻. Their respective genotype can be

- A. I^B / I^A / ii
- B. I^B I^B / I^A A / ii
- C. I^A I^B / i^A / i^B
- D. I^A i / I^B i / I^A i
- E. i^B i / i^A i / I^A I^B

Choose the most appropriate answer from the options given below :

- (1) D & E only
- (2) A only
- (3) B only
- (4) C & B only

187 Match List I with List II :

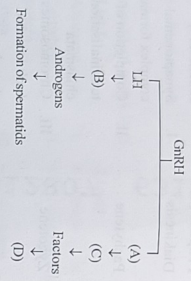
- | | |
|---------------------------------------|---------------------------------------|
| List I | List II |
| A. Unicellular glandular epithelium | I. Salivary glands |
| B. Compound epithelium | II. Pancreas |
| C. Multicellular glandular epithelium | III. Goblet cells of alimentary canal |
| D. Endocrine glandular epithelium | IV. Moist surface of buccal cavity |

Choose the correct answer from the options given below :

- (1) A-III, B-I, C-IV, D-III
- (2) A-III, B-I, C-III, D-IV
- (3) A-IV, B-III, C-I, D-II
- (4) A-III, B-IV, C-I, D-II

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188 Identify the correct option (A), (B), (C), (D) with respect to spermatogenesis.



- (1) ICSH, Leydig cells, Sertoli cells, spermatozoa
- (2) FSH, Leydig cells, Sertoli cells, spermatozoa
- (3) ICSH, Interstitial cells, Leydig cells, spermatozoa
- (4) FSH, Sertoli cells, Leydig cells, spermatozoa

189 Given below are two statements :

Statement I : Gause's competitive exclusion principle states that two closely related species competing for different resources cannot exist indefinitely.

Statement II : According to Gause's principle, during competition, the inferior will be eliminated. This may be true if resources are limiting.

In the light of the above statements, choose the correct answer from the options given below :

- (1) Statement I is false but Statement II is true.
- (2) Both Statement I and Statement II are true.
- (3) Both Statement I and Statement II are false.
- (4) Statement I is true but Statement II is false.

I Contd...

190 Match List I with List II related to digestive system of cockroach.

- | | |
|---|-------------------------|
| List I | List II |
| A. The structures used for storing of food. | I. Gizzard |
| B. Ring of 6-8 blind tubules at junction of foregut and midgut. | II. Gastric Caeca |
| C. Ring of 100-150 yellow coloured thin filament at junction of midgut and hindgut. | III. Malpighian tubules |
| D. The structures used for grinding the food. | IV. Crop |

Choose the correct answer from the options given below :

- (1) A-III, B-II, C-IV, D-I
- (2) A-IV, B-III, C-II, D-I
- (3) A-I, B-II, C-III, D-IV
- (4) A-IV, B-III, C-II, D-I

191 Match List I with List II :

- | | |
|--------------------|------------------------|
| List I | List II |
| A. Mesozoic Era | I. Lower invertebrates |
| B. Proterozoic Era | II. Fish & Amphibia |
| C. Cenozoic Era | III. Birds & Reptiles |
| D. Paleozoic Era | IV. Mammals |

Choose the correct answer from the options given below :

- (1) A-III, B-I, C-IV, D-II
- (2) A-II, B-I, C-III, D-IV
- (3) A-III, B-I, C-II, D-IV
- (4) A-I, B-II, C-IV, D-III

192 Match List I with List II :

- | | |
|----------------|---|
| List I | List II |
| A. P wave | I. Heart muscles are electrically silent. |
| B. QRS complex | II. Depolarisation of ventricles. |
| C. T wave | III. Depolarisation of atria. |
| D. T-P gap | IV. Repolarisation of ventricles. |

Choose the correct answer from the options given below :

- (1) A-IV, B-II, C-I, D-III
- (2) A-I, B-III, C-IV, D-II
- (3) A-III, B-II, C-IV, D-I
- (4) A-II, B-III, C-I, D-IV

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193 The following are the statements about non-chordates :

- A. Pharynx is perforated by gill slits.
- B. Notochord is absent.
- C. Central nervous system is dorsal.
- D. Heart is dorsal if present.
- E. Post anal tail is absent.

Choose the most appropriate answer from the options given below :

- (1) B, C & D only
- (2) A & C only
- (3) A, B & D only
- (4) B, D & E only

194 Regarding catalytic cycle of an enzyme action, select the correct sequential steps :

- A. Substrate enzyme complex formation.
- B. Free enzyme ready to bind with another substrate.
- C. Release of products.
- D. Chemical bonds of the substrate broken.
- E. Substrate binding to active site.

Choose the correct answer from the options given below :

- (1) E, D, C, B, A
- (2) E, A, D, C, B
- (3) A, E, B, D, C
- (4) B, A, C, D, E

195 Given below are two statements :

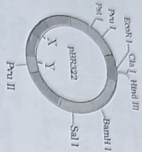
Statement I : Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

Statement II : Both bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Statement I is incorrect but Statement II is correct.
- (2) Both Statement I and Statement II are correct.
- (3) Both Statement I and Statement II are incorrect.
- (4) Statement I is correct but Statement II is incorrect.

176 The following diagram showing restriction sites in a cloning vector pBR322. Find the role of X^r and r^s genes.



- (1) Gene X^r is responsible for recognition sites and r^s is responsible for antibiotic resistance.
- (2) The gene X^r is responsible for resistance to antibiotics and r^s for protein involved in the replication of Plasmid.
- (3) The gene X^r is responsible for controlling the copy number of the linked DNA and r^s for protein involved in the replication of Plasmid.
- (4) The gene X^r is for protein involved in replication of Plasmid and r^s for resistance to antibiotics.

177 Match List I with List II:

- | | |
|---------------------------|---|
| List I | List II |
| A. Fibrous joints | I. Adipose |
| B. Cartilaginous joints | II. vertebral, limited movement |
| C. Hinge joints | III. Hamerus and Pectoral girdle, rotational movement |
| D. Ball and socket joints | IV. Skull, don't allow any movement |
- Choose the correct answer from the options given below:
- (1) A-II, B-I, C-IV, D-III
 - (2) A-IV, B-II, C-III, D-I
 - (3) A-I, B-III, C-II, D-IV
 - (4) A-II, B-III, C-I, D-IV

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178 Which of the following is not a steroid hormone?

- (1) Glucagon
- (2) Cortisol
- (3) Testosterone
- (4) Progesterone

179 Match List I with List II:

- | | |
|---------------------|------------------------|
| List I | List II |
| A. Axoneme | I. Centriole |
| B. Carwheel pattern | II. Cilia and flagella |
| C. Crista | III. Chromosome |
| D. Satellite | IV. Mitochondria |
- Choose the correct answer from the options given below:
- (1) A-II, B-I, C-IV, D-III
 - (2) A-IV, B-III, C-II, D-I
 - (3) A-IV, B-II, C-III, D-I
 - (4) A-II, B-IV, C-I, D-III

180 Match List I with List II:

- | | |
|---------------|----------------------------------|
| List I | List II |
| A. Cocaine | I. Effective sedative in surgery |
| B. Heroin | II. <i>Gambusia sativa</i> |
| C. Morphine | III. <i>Erythroxylum</i> |
| D. Marijuana | IV. <i>Papaver somniferum</i> |
- Choose the correct answer from the options given below:
- (1) A-III, B-IV, C-I, D-II
 - (2) A-IV, B-III, C-I, D-II
 - (3) A-I, B-III, C-II, D-IV
 - (4) A-II, B-I, C-III, D-IV

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- In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on:
- (1) 11th segment
 - (2) 5th segment
 - (3) 10th segment
 - (4) 8th and 9th segment

| Contd...

182 Match List I with List II:

- | | |
|----------------------------|---|
| List I | List II |
| (Sub Phasero) Propriose B) | I. (Specific characters) |
| A. Diakinesis | II. Synaptonemal complex formation |
| B. Pachytene | III. Completion of terminalisation of chiasmata |
| C. Zygotene | IV. Chromosomes look like thin threads |
| D. Leptotene | V. Appearance of nodules |
- Choose the correct answer from the options given below:
- (1) A-IV, B-III, C-II, D-I
 - (2) A-IV, B-III, C-III, D-I
 - (3) A-I, B-II, C-IV, D-III
 - (4) A-II, B-IV, C-I, D-III

183 Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R):

- Assertion A:** Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.
- Reason R:** Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby.
- In the light of the above statements, choose the most appropriate answer from the options given below:
- (1) A is not correct but R is correct.
 - (2) Both A and R are correct and R is the correct explanation of A.
 - (3) Both A and R are correct but R is NOT the correct explanation of A.
 - (4) A is correct but R is not correct.

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184 Match List I with List II:

- | | |
|---------------------------|----------------------------------|
| List I | List II |
| A. Down's syndrome | I. 11 th chromosome |
| B. α -Thalassemia | II. 'X' chromosome |
| C. β -Thalassemia | III. 21 st chromosome |
| D. Klinefelter's syndrome | IV. 16 th chromosome |
- Choose the correct answer from the options given below:
- (1) A-IV, B-I, C-II, D-III
 - (2) A-I, B-III, C-IV, D-IV
 - (3) A-II, B-III, C-IV, D-I
 - (4) A-III, B-IV, C-I, D-II

185 Match List I with List II:

- | | |
|-----------------|--|
| List I | List II |
| A. Pons | I. Provides additional space for Neurons, regulates posture and balance. |
| B. Hypothalamus | II. Controls respiration and gastric secretions. |
| C. Medulla | III. Connects different regions of the brain. |
| D. Cerebellum | IV. Neuro secretory cells |
- Choose the correct answer from the options given below:
- (1) A-II, B-I, C-III, D-IV
 - (2) A-II, B-III, C-I, D-IV
 - (3) A-III, B-IV, C-II, D-I
 - (4) A-I, B-III, C-II, D-IV

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Zoology : Section-A (Q. No. 151 to 185)

149 Which of the following statement is correct regarding the process of replication in *E.coli*?

- (1) The DNA dependent DNA polymerase catalyses polymerization in 5' → 3' direction.
- (2) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3' → 5'.
- (3) The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5' → 3'.
- (4) The DNA dependent DNA polymerase catalyses polymerization in 5' → 3' as well as 3' → 5' direction.

150 Match List I with List II

- | | |
|------------------------------|--|
| List I | List II |
| A. Citric acid cycle | I. Cytoplasm |
| B. Glycolysis | II. Mitochondrial matrix |
| C. Electron transport system | III. Intermembrane space of mitochondria |
| D. Proton gradient | IV. Inner mitochondrial membrane |

Choose the correct answer from the options given below:

- (1) A-IV, B-III, C-II, D-I
- (2) A-I, B-II, C-III, D-IV
- (3) A-II, B-I, C-IV, D-III
- (4) A-III, B-IV, C-I, D-II

151 Given below are two statements :

Statement I : In the nephron, the descending limb of loop of Henle is impermeable to water and permeable to electrolytes.

Statement II : The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.

In the light of the above statements, choose the correct answer from the options given below :

- (1) Statement I is false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

152 Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R :

Assertion A : FSH acts upon ovarian follicles in female and Leydig cells in male.

Reason R : Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human being.

In the light of the above statements, choose the correct answer from the options given below :

- (1) A is false but R is true
- (2) Both A and R are true and R is the correct explanation of A.
- (3) Both A and R are true but R is NOT the correct explanation of A.
- (4) A is true but R is false

153 Which one of the following factors will not affect the Hardy-Weinberg equilibrium?

- (1) Constant gene pool
- (2) Genetic recombination
- (3) Genetic drift
- (4) Gene migration

154 Which of the following are Autoimmune disorders?

- A. Myasthenia gravis
 - B. Rheumatoid arthritis
 - C. Gout
 - D. Muscular dystrophy
 - E. Systemic Lupus Erythematosus (SLE)
- Choose the most appropriate answer from the options given below :
- (1) C, D & E only
 - (2) A, B & D only
 - (3) A, B & E only
 - (4) B, C & E only

155 Given below are some stages of human evolution. Arrange them in correct sequence. (Past to Recent)

- A. *Homo habilis*
- B. *Homo sapiens*
- C. *Homo neanderthalensis*
- D. *Homo erectus*

Choose the correct sequence of human evolution from the options given below :

- (1) A-D-C-B
- (2) D-A-C-B
- (3) B-A-D-C
- (4) C-B-D-A

156 Given below are two statements :

Statement I : The presence or absence of hymen is not a reliable indicator of virginity.

Statement II : The hymen is torn during the first coitus only.

In the light of the above statements, choose the correct answer from the options given below :

- (1) Statement I is false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

157 Match List I with List II :

- | | |
|--------------------------|------------------|
| List I | List II |
| A. Non-medicated IUD | I. Multiloop 375 |
| B. Copper-releasing IUD | II. Progestogens |
| C. Hormone releasing IUD | III. Lippos loop |
| D. Implants | IV. LNG-20 |
- Choose the correct answer from the options given below :
- (1) A-III, B-I, C-IV, D-II
 - (2) A-II, B-I, C-II, D-IV
 - (3) A-I, B-III, C-IV, D-II
 - (4) A-IV, B-I, C-II, D-III

158 Consider the following statements :

- A. Annelids are true coelomates
 - B. Foriferans are pseudocoelomates
 - C. Aschelminthes are acoelomates
 - D. Platyhelminthes are pseudocoelomates
- Choose the correct answer from the options given below :
- (1) D only
 - (2) B only
 - (3) A only
 - (4) C only

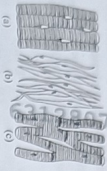
159 Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

- (1) Low pCO₂ and High temperature
- (2) High PO₂ and High pCO₂
- (3) High PO₂ and Lesser H⁺ concentration
- (4) Low pCO₂ and High H⁺ concentration

160 Match List I with List II :

- | | |
|---------------------------------|--|
| List I | List II |
| A. Expiratory capacity | I. Expiratory reserve volume + Tidal volume + Inspiratory reserve volume |
| B. Functional residual capacity | II. Tidal volume + Expiratory reserve volume |
| C. Vital capacity | III. Tidal volume + Inspiratory reserve volume |
| D. Inspiratory capacity | IV. Expiratory reserve volume + Residual volume |
- Choose the correct answer from the options given below :
- (1) A-I, B-III, C-II, D-IV
 - (2) A-II, B-IV, C-I, D-III
 - (3) A-III, B-II, C-IV, D-I
 - (4) A-II, B-I, C-IV, D-III

161 Three types of muscles are given as a, b and c. Identify the correct matching pair along with their location in human body :



Name of muscle/location

- (1) (a) Involuntary - Nose tip
 (b) Skeletal - Bone
 (c) Cardiac - Heart
- (2) (a) Smooth - fleshes
 (b) Skeletal - Legs
 (c) Cardiac - Heart
- (3) (a) Skeletal - Triceps
 (b) Smooth - Stomach
 (c) Cardiac - Heart
- (4) (a) Skeletal - Biceps
 (b) Involuntary - Intestine
 (c) Smooth - Heart

162 The flippers of the Penguins and Dolphins are the example of the

- (1) Divergent evolution
 (2) Adaptive radiation
 (3) Natural selection
 (4) Convergent evolution

163 Match List I with List II :

- List I
 A. Typhoid
 B. Leishmaniasis
 C. Ringworm
 D. Filariasis
- List II
 I. Fungus
 II. Nematode
 III. Protozoa
 IV. Bacteria

Choose the correct answer from the options given below :

- (1) A-II, B-IV, C-III, D-I
 (2) A-I, B-III, C-II, D-IV
 (3) A-IV, B-III, C-I, D-II
 (4) A-III, B-I, C-IV, D-III

S3_English |

164 Following are the stages of pathway for conduction of an action potential through the heart :

- A. AV bundle
 B. Purkinje fibres
 C. AV node
 D. Bundle branches
 E. SA node

Choose the correct sequence of pathway from the options given below :

- (1) E-A-D-B-C
 (2) E-C-A-D-B
 (3) A-E-C-B-D
 (4) B-D-E-C-A

165 Match List I with List II :

- List I
 A. Lipase
 B. Nuclease
 C. Protease
 D. Amylase
- List II
 I. Peptide bond
 II. Ester bond
 III. Glycosidic bond
 IV. Phosphodiester bond

Choose the correct answer from the options given below :

- (1) A-IV, B-I, C-III, D-II
 (2) A-IV, B-II, C-III, D-I
 (3) A-III, B-II, C-I, D-IV
 (4) A-II, B-IV, C-I, D-III

166 Which of the following statements is incorrect?

- (1) Bio-reactors have an agitator system, an oxygen delivery system and foam control system.
 (2) A bio-reactor provides optimal growth conditions for achieving the desired product.
 (3) Most commonly used bio-reactors are of stirred type.
 (4) Bio-reactors are used to produce small scale bacterial cultures.

167 The "Ti plasmid" of *Agrobacterium tumefaciens* stands for

- (1) Temperature independent plasmid
 (2) Tumour inhibiting plasmid
 (3) Tumour independent plasmid
 (4) Tumour inducing plasmid

| Contd...

168 Match List I with List II :

- List I
 A. Common cold
 B. Haemozoin
 C. Widal test
 D. Allergy
- List II
 I. Typhoid
 II. Rhinoviruses
 III. Dust mites
 IV. *Plasmodium*

Choose the correct answer from the options given below :

- (1) A-IV, B-II, C-III, D-I
 (2) A-II, B-IV, C-III, D-I
 (3) A-I, B-III, C-II, D-IV
 (4) A-III, B-I, C-IV, D-III

169 Following are the stages of cell division :

- A. Gap 2 phase
 B. Cytokinesis
 C. Synthesis phase
 D. Karyokinesis
 E. Gap 1 phase

Choose the correct sequence of stages from the options given below :

- (1) E-C-A-D-B
 (2) C-E-D-A-B
 (3) E-B-D-A-C
 (4) B-D-E-A-C

170 Which of the following is not a natural/traditional contraceptive method?

- (1) Vagitis
 (2) Coitus interruptus
 (3) Periodic abstinence
 (4) Lactational amenorrhea

171 Match List I with List II :

- List I
 A. Pleuroprachia
 B. Radula
 C. Stomochord
 D. Air bladder
- List II
 I. Mollusca
 II. Ctenophora
 III. Osteichthyes
 IV. Hemichordata

Choose the correct answer from the options given below :

- (1) A-IV, B-III, C-II, D-I
 (2) A-IV, B-II, C-III, D-I
 (3) A-II, B-I, C-IV, D-III
 (4) A-II, B-IV, C-I, D-III

S3_English |

172 Which one is the correct product of DNA dependent RNA polymerase to the given template?

- 3'-TGCATGCGCAAAATCCATTGAS'
 (1) 5'ATGTACCGGTTTATAGGTAAGT3'
 (2) 5'AUGUACCGUUUAUAGGUAAGU3'
 (3) 5'AUGUAAAGUUUAUAGGUAAGU3'
 (4) 5'AUGUACCGUUUAUAGGGAAGU3'

173 Match List I with List II :

- List I
 A. a-1 antitrypsin
 B. Gy Iab
 C. Gy Iac
 D. Enzyme
- List II
 I. Cotton bollworm
 II. ADA deficiency
 III. Emphysema
 IV. Corn borer

Choose the correct answer from the options given below :

- (1) A-II, B-IV, C-I, D-III
 (2) A-II, B-I, C-IV, D-III
 (3) A-III, B-I, C-II, D-IV
 (4) A-II, B-IV, C-IV, D-II

174 Match List I with List II :

- List I
 A. *Pterophyllum*
 B. *Myxine*
 C. *Prisus*
 D. *Exocoetus*
- List II
 I. Hag fish
 II. Saw fish
 III. Angel fish
 IV. Flying fish

Choose the correct answer from the options given below :

- (1) A-III, B-II, C-I, D-IV
 (2) A-II, B-I, C-III, D-IV
 (3) A-III, B-I, C-II, D-IV
 (4) A-IV, B-I, C-II, D-III

175 Which of the following is not a component of Fallopian tube?

- (1) Ampulla
 (2) Uterine fundus
 (3) Isthmus
 (4) Infundibulum

| Contd...

136 Match List I with List II

List I

- A. Rose
- B. Pea
- C. Cotton
- D. Mango

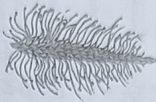
List II

- I. Twisted aestivation
- II. Papilionous flower
- III. Drupe
- IV. Marginal placentation

Choose the correct answer from the options given below:

- (1) A-I, B-III, C-IV, D-I
- (2) A-II, B-IV, C-I, D-III
- (3) A-I, B-II, C-III, D-IV
- (4) A-IV, B-III, C-II, D-I

137 Identify the correct description about the given figure:



- (1) Compact inflorescence showing complete autogamy.
- (2) Wind pollinated plant inflorescence showing flowers with well exposed stamens.
- (3) Water pollinated flowers showing stamens with mucilaginous covering.
- (4) Cleistogamous flowers showing autogamy.

138 Match List I with List II

List I

- A. GLUT-4
- B. Insulin
- C. Trypsin
- D. Collagen

List II

- I. Hormone
- II. Enzyme
- III. Intercellular ground substance
- IV. Enables glucose transport into cells

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-I, D-II
- (2) A-IV, B-I, C-II, D-III
- (3) A-I, B-II, C-III, D-IV
- (4) A-II, B-III, C-IV, D-I

S3_English I

139 Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, but, increases the yield?

- (1) Abscisic acid
- (2) Auxin
- (3) Gibberellin
- (4) Cytokinin

140 Which of the following are used in somatic hybridization involving two varieties of plants?

- (1) Pollens
- (2) Callus
- (3) Somatic embryos
- (4) Protoplasts

141 Given below are two statements:

Statement I : In C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.

Statement II : In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Statement I is false but Statement II is true
- (2) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is true but Statement II is false

142 Read the following statements and choose the set of correct statements

In the members of Phaeophyceae,

- A. Asexual reproduction occurs usually by biflagellate zoospores
- B. Sexual reproduction is by oogamous method only.
- C. Stored food is in the form of carbohydrates which is either mannitol or laminarin.
- D. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.
- E. Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.

Choose the correct answer from the options given below:

- (1) A, B, C and E only
- (2) A, B, C and D only
- (3) B, C, D and E only
- (4) A, C, D and E only

I Contd...

143 Match List I with List II

List I

- A. Robert May
- B. Alexander von Humboldt
- C. Paul Ehrlich
- D. David Tilman

List II

- I. Species-Area relationship
- II. Long term ecosystem experiment using out door plots
- III. Global species diversity at about 7 million
- IV. Rivet popper hypothesis

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-II, D-I
- (2) A-II, B-III, C-I, D-IV
- (3) A-III, B-I, C-IV, D-II
- (4) A-I, B-III, C-II, D-IV

144 Match List I with List II

List I

- A. Frederick Griffith
- B. Francois Jacob & Jaquec
- C. Har Gobind Khorana
- D. Meselson & Stahl

List II

- I. Genetic code
- II. Semi-conservative mode of DNA replication
- III. Transformation
- IV. *Lac* operon

Choose the correct answer from the options given below:

- (1) A-IV, B-I, C-II, D-III
- (2) A-III, B-II, C-I, D-IV
- (3) A-II, B-IV, C-I, D-II
- (4) A-II, B-III, C-IV, D-I

S3_English I

145 Match List I with List II

List I

- (Types of Stamens)
- A. Monodelphous
- B. Diadelphous
- C. Polyadelphous
- D. Epiphyllous

List II

- (Example)
- I. Citrus
- II. Pea
- III. Lily
- IV. China-rose

Choose the correct answer from the options given below:

- (1) A-III, B-I, C-IV, D-II
- (2) A-IV, B-II, C-I, D-III
- (3) A-IV, B-I, C-II, D-III
- (4) A-I, B-II, C-IV, D-III

146 The DNA present in chloroplast is:

- (1) Circular, single stranded
- (2) Linear, double stranded
- (3) Circular, double stranded
- (4) Linear, single stranded

147 In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is

$100x \text{ (kcal } m^{-2} \text{) } yr^{-1}$, what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem?

- (1) $\frac{100x}{3x} \text{ (kcal } m^{-2} \text{) } yr^{-1}$
- (2) $\frac{x}{10} \text{ (kcal } m^{-2} \text{) } yr^{-1}$
- (3) $x \text{ (kcal } m^{-2} \text{) } yr^{-1}$
- (4) $10x \text{ (kcal } m^{-2} \text{) } yr^{-1}$

148 Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.

- (1) Isocitrate \rightarrow α -ketoglutaric acid
- (2) Malic acid \rightarrow Oxaloacetic acid
- (3) Succinic acid \rightarrow Malic acid
- (4) Succinyl-CoA \rightarrow Succinic acid

I Contd...

- 122 The type of conservation in which the threatened species are taken out from their natural habitat and placed in special setting where they can be protected and given special care is called:
- (1) Sustainable development
 - (2) *In-situ* conservation
 - (3) Biodiversity conservation
 - (4) Semi-conservative method

- 123 Which of the following are required for the dark reaction of photosynthesis?
- A. Light
 - B. Chlorophyll
 - C. CO₂
 - D. ATP
 - E. NADPH

- 124 Given below are two statements:
Statement I : Bt toxins are insect group specific and coded by a gene *cry* IAc.
Statement II : Bt toxin exists as inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect the inactive protoxin gets converted into active form due to acidic pH of the insect gut.
- In the light of the above statements, choose the correct answer from the options given below:
- (1) Statement I is false but Statement II is true
 - (2) Both Statement I and Statement II are true
 - (3) Both Statement I and Statement II are false
 - (4) Statement I is true but Statement II is false

- 125 These are regarded as major causes of biodiversity loss:
- A. Over exploitation
 - B. Co-extinction
 - C. Mutation
 - D. Habitat loss and fragmentation
 - E. Migration

- Choose the correct option:
- (1) A, B and D only
 - (2) A, C and D only
 - (3) A, B, C and D only
 - (4) A, B and E only

S3_English I

- 126 In the given figure, which component has thin outer walls and highly thickened inner walls?



- (1) B
- (2) C
- (3) D
- (4) A

- 127 The capacity to generate a whole plant from any cell of the plant is called:
- (1) Somatic hybridization
 - (2) Totipotency
 - (3) Micropropagation
 - (4) Differentiation

- 128 A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotypic ratio is expected in the progeny?
- (1) Red, Pink as well as white flowered plants
 - (2) Only red flowered plants
 - (3) Red flowered as well as pink flowered plants
 - (4) Only pink flowered plants

- 129 Match List I with List II
- | | |
|--------------------|--|
| List I | List II |
| A. Nucleolus | I. Site of formation of glycolipid |
| B. Centriole | II. Organization like the carwheel |
| C. Leucoplasts | III. Site for active ribosomal RNA synthesis |
| D. Golgi apparatus | IV. For storing nutrients |
- Choose the correct answer from the options given below:
- (1) A-I, B-II, C-III, D-IV
 - (2) A-II, B-III, C-IV, D-I
 - (3) A-II, B-III, C-I, D-IV
 - (4) A-III, B-IV, C-II, D-I

[Contd...

- 130 Identify the type of flowers based on the position of ovary, corolla and androecium with respect to the ovary from the given figures (a) and (b)



- (1) (a) Perigynous; (b) Perigynous
- (2) (a) Epigynous; (b) Hypogynous
- (3) (a) Hypogynous; (b) Epigynous
- (4) (a) Perigynous; (b) Epigynous

- 131 Identify the set of correct statements:
- A. The flowers of *Lilium* are colourful and produce nectar.
 - B. The flowers of waterlily are not pollinated by water.
 - C. In most of water-pollinated species, the pollen grains are protected from wetting.
 - D. Pollen grains of some hydrophytes are long and ribbon like.
 - E. In some hydrophytes, the pollen grains are carried passively inside water.

- Choose the correct answer from the options given below:
- (1) B, C, D and E only
 - (2) C, D and E only
 - (3) A, B, C and D only
 - (4) A, C, D and E only

S3_English I

- 132 Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin can help in cell division in grasses, to produce growth.
- (1) promotes apical dominance.
 - (2) promotes abscission of mature leaves only.
 - (3) does not affect mature monocotyledonous plants.
 - (4) What is the fate of a piece of DNA carrying only gene of interest which is transferred into an alien organism?

- A. The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
 - B. It may get integrated into the genome of the recipient.
 - C. It may multiply and be inherited along with the host DNA.
 - D. The alien piece of DNA is not an integral part of chromosomes.
 - E. It shows ability to replicate.
- Choose the correct answer from the options given below:
- (1) A and E only
 - (2) A and B only
 - (3) D and E only
 - (4) B and C only

- 134 Which one of the following is not a criterion for classification of fungi?
- (1) Fruiting body
 - (2) Morphology of mycelium
 - (3) Mode of nutrition
 - (4) Mode of spore formation

- 135 Which of the following is an example of actinomorphic flower?
- (1) *Sesbania*
 - (2) *Datura*
 - (3) *Cassia*
 - (4) *Pisum*

[Contd...

90 The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is:

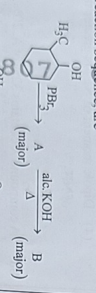
(Given $R = 2.0 \text{ cal K}^{-1} \text{ mol}^{-1}$)

- (1) 100 calories
- (2) 0 calories
- (3) -413.14 calories
- (4) 413.14 calories

91 The plot of osmotic pressure (Π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope $25.731 \text{ bar mol}^{-1}$. The temperature at which the osmotic pressure measurement is done is: (Use $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$)

- (1) 12.05°C
- (2) 37°C
- (3) 310°C
- (4) 25.73°C

92 Major products A and B formed in the following reaction sequence are

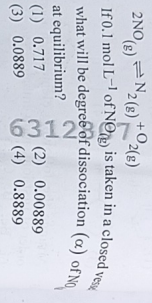


- (1) A = CC(C)C; B = CC(C)C
- (2) A = CC(C)C; B = CC(C)C
- (3) A = CC(C)C; B = CC(C)C
- (4) A = CC(C)C; B = CC(C)C

93 Mass in grams of copper deposited by passing 9.6481 A current through a voltmeter containing copper sulphate solution for 100 seconds is: (Given: Molar mass of $\text{Cu} = 63 \text{ g mol}^{-1}$, $F = 96487 \text{ C}$)

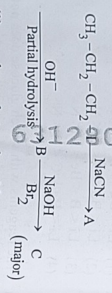
- (1) 0.0315 g
- (2) 3.15 g
- (3) 0.315 g
- (4) 31.5 g

94 Consider the following reaction in a sealed vessel at equilibrium with concentrations of $\text{N}_2 = 3.0 \times 10^{-3} \text{ M}$, $\text{O}_2 = 4.2 \times 10^{-3} \text{ M}$ and $\text{NO} = 2.8 \times 10^{-3} \text{ M}$.



- (1) 0.717
- (2) 0.00889
- (3) 0.889
- (4) 0.8889

95 Identify the major product C formed in following reaction sequence:

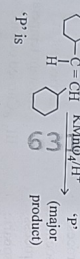


- (1) α -bromobutanoic acid
- (2) propylamine
- (3) butylamine
- (4) butanamide

96 The pair of lanthanoid ions which are diamagnetic is

- (1) Pr^{3+} and Sm^{3+}
- (2) Ce^{4+} and Yb^{2+}
- (3) Ce^{3+} and Eu^{2+}
- (4) Gd^{3+} and Eu^{3+}

97 For the given reaction:



- (1) CC(=O)C1=CC=CC=C1
- (2) CC=O
- (3) CC(=O)O
- (4) CC(O)C1=CC=CC=C1

98 Given below are two statements:

Statement I: $[\text{Co}(\text{NH}_3)_6]^{3+}$ is a homoleptic complex whereas $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ is a heteroleptic complex.

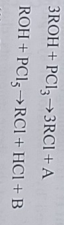
Statement II: Complex $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ has only one kind of ligands but $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ has more than one kind of ligands.

- (1) Statement I is false but Statement II is true.
- (2) Both Statement I and Statement II are true.
- (3) Both Statement I and Statement II are false.
- (4) Statement I is true but Statement II is false.

99 The rate of a reaction quadruples when temperature changes from 27°C to 57°C. Calculate the energy of activation.

- (1) 3804 kJ/mol
- (2) 38.04 kJ/mol
- (3) 380.4 kJ/mol
- (4) 3.80 kJ/mol

100 The products A and B obtained in the following reactions, respectively, are



- (1) H_3PO_3 and POCl_3
- (2) POCl_3 and H_3PO_3
- (3) POCl_3 and H_3PO_4
- (4) H_3PO_4 and POCl_3

Botany : Section-A (Q. No. 101 to 135)

101 The lactose present in the growth medium of bacteria is transported to the cell by the action of:

- (1) Polymerase
- (2) Beta-galactosidase
- (3) Acetylase
- (4) Permease

102 Lecithin, a small molecular weight organic compound found in living tissues, is an example of:

- (1) Carbohydrates
- (2) Amino acids
- (3) Phospholipids
- (4) Glycerides

103 Match List I with List II

- | | |
|-----------------------------|-------------------|
| List I | List II |
| A. <i>Clostridium</i> | I. Ethanol |
| B. <i>Saccharomyces</i> | II. Streptokinase |
| C. <i>Trichoderma</i> | III. Butyric acid |
| D. <i>Streptococcus</i> sp. | IV. Cyclosporin-A |

Choose the correct answer from the options given below:

- (1) A-IV, B-I, C-III, D-II
- (2) A-III, B-I, C-II, D-IV
- (3) A-II, B-IV, C-III, D-I
- (4) A-III, B-I, C-IV, D-II

104 The equation of Verhulst-Pearl logistic growth is

$$\frac{dN}{dt} = rN \left[\frac{K-N}{K} \right]$$

From this equation, K indicates:

- (1) Population density
- (2) Intrinsic rate of natural increase
- (3) Biotic potential
- (4) Carrying capacity

105 Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of:

- (1) 10 bp
- (2) 8 bp
- (3) 6 bp
- (4) 4 bp

75 Given below are two statements:

Statement I : The boiling point of three isomeric pentanes follows the order

pentane > isopentane > neopentane

Statement II : When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

- In the light of the above statements, choose the most appropriate answer from the options given below:
- Statement I is incorrect but Statement II is correct.
 - Both Statement I and Statement II are correct.
 - Both Statement I and Statement II are incorrect.
 - Statement I is correct but Statement II is incorrect.

76 Among Group 16 elements, which one does NOT show -2 oxidation state?

- Po
- O
- Se
- Te

77 The Henry's law constant (K_H) values of three gases (A, B, C) in water are 1.45 , 2×10^{-5} and 35 bar, respectively. The solubility of these gases in water follow the order:

- $A > B > C$
- $B > A > C$
- $B > C > A$
- $A > C > B$

78 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution, the mass of sodium hydroxide left unreacted is equal to

- 200 mg
- 750 mg
- 250 mg
- Zero mg

79 Spin only magnetic moment is same for which of the following ions?

- Ti^{3+}
- Cr^{2+}
- Mn^{2+}
- Fe^{2+}
- Sr^{2+}

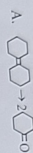
Choose the most appropriate answer from the options given below:

- A and D only
- B and D only
- A and E only
- B and C only

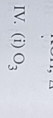
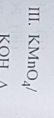
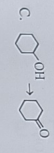
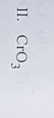
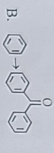
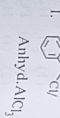
S3_English]

80 Match List I with List II.

List I (Reaction)



List II (Reagent/Condition)



Choose the correct answer from the options given below:

- A-I, B-IV, C-II, D-III
- A-IV, B-I, C-III, D-II
- A-III, B-I, C-II, D-IV
- A-IV, B-I, C-II, D-III

81 Match List I with List II.

List I (Molecule)

List II (Number and types of bonds between two carbon atoms)

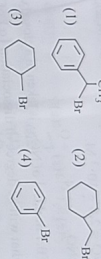
- | | |
|---------------------------|--|
| A. ethane | I. one σ -bond and two π -bonds |
| B. ethene | II. two π -bonds |
| C. carbon molecule, C_2 | III. one σ -bond |
| D. ethyne | IV. one σ -bond and one π -bond |

Choose the correct answer from the options given below:

- A-III, B-IV, C-I, D-II
- A-I, B-IV, C-II, D-III
- A-IV, B-III, C-II, D-I
- A-III, B-IV, C-II, D-I

I Contd...

82 The compound that will undergo S_N1 reaction with the fastest rate is



83 Arrange the following elements in increasing order of first ionization enthalpy:

- Li, Be, B, C, N

- $Li < Be < N < B < C$
- $Li < Be < B < C < N$
- $Li < B < Be < C < N$
- $Li < Be < C < B < N$

84 The reagents with which glucose does not react to give the corresponding tests/products are

- Tollen's reagent
- Schiff's reagent
- HClN
- NH_4OH
- $NaHSO_3$

Choose the correct options from the given below:

- E and D
- B and C
- A and D
- A and E

85 Match List I with List II.

List I (Process)

List II (Conditions)

- | | |
|-----------------------|---|
| A. Isothermal process | I. No heat exchange |
| B. Isochoric process | II. Carried out at constant temperature |
| C. Isobaric process | III. Carried out at constant volume |
| D. Adiabatic process | IV. Carried out at constant pressure |

Choose the correct answer from the options given below:

- A-I, B-III, C-IV, D-I
- A-IV, B-III, C-II, D-I
- A-IV, B-II, C-III, D-I
- A-I, B-II, C-III, D-IV

S3_English]

I Contd...

86 During the preparation of Mohr's salt solution (ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis of Fe^{2+} ion?

- dilute sulphuric acid
- dilute hydrochloric acid
- concentrated sulphuric acid
- dilute nitric acid

87 Identify the correct answer:

(1) Three canonical forms can be drawn for CO_3^{2-} ion.

- Three resonance structures can be drawn for ozone.
- BF_3 has non-zero dipole moment.
- Dipole moment of NF_3 is greater than that of NH_3 .

88 A compound X contains 32% of A, 20% of B and remaining percentage of C. Then, the empirical formula of X is :

- ABC₄
- A₂BC₂
- ABC₃
- AB₂C₂

89 Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

- | | |
|--------------|--------------|
| A. Al^{3+} | B. Cr^{3+} |
| C. Ba^{2+} | D. Co^{2+} |
| E. Mg^{2+} | |

Choose the correct answer from the options given below:

- E, A, B, C, D
- B, A, D, C, E
- B, C, A, D, E
- E, C, D, B, A

- 62 Given below are two statements:
Statement I : Aniline does not undergo Friedel-Crafts alkylation reaction.
Statement II : Aniline cannot be prepared through Gabriel synthesis.
 In the light of the above statements, choose the correct answer from the options given below:
- Statement I is incorrect but Statement II is true.
 - Both Statement I and Statement II are true.
 - Both Statement I and Statement II are false.
 - Statement I is correct but Statement II is false.

- 63 Match List I with List II.
- | | |
|---------------|-----------------------|
| List I | List II |
| (Compound) | (Shape/geometry) |
| A. NH_3 | I. Trigonal Pyramidal |
| B. BH_3 | II. Square Planar |
| C. XeF_4 | III. Octahedral |
| D. SF_6 | IV. Square Pyramidal |
- Choose the correct answer from the options given below:
- A-II, B-III, C-IV, D-I
 - A-I, B-IV, C-II, D-III
 - A-II, B-IV, C-III, D-I
 - A-III, B-IV, C-I, D-II

- 64 Match List I with List II.
- | | |
|----------------|-------------------------------------|
| List I | List II |
| Quantum Number | Information provided |
| A. m_l | I. shape of orbital |
| B. m_s | II. size of orbital |
| C. l | III. orientation of orbital |
| D. n | IV. orientation of spin of electron |
- Choose the correct answer from the options given below:
- A-II, B-I, C-IV, D-III
 - A-I, B-III, C-II, D-IV
 - A-III, B-IV, C-I, D-II
 - A-III, B-IV, C-II, D-I

- 65 The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of
- d^3 to d^5 configuration
 - d^2 to d^4 configuration
 - d^3 to d^2 configuration
 - d^4 to d^5 configuration

- 66 In which of the following processes entropy increases?
- A liquid evaporates to vapour.
 - Temperature of a crystalline solid lowered from 130 K to 0 K.
 - $2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$
 - $Cl_2(g) \rightarrow 2Cl(g)$
- Choose the correct answer from the options given below:
- C and D
 - A and C
 - A, B and D
 - A, C and D

- 67 The energy of an electron in the ground state ($n = 1$) for He^+ ions is $-x$ J, then that for an electron in $n = 2$ state for Be^{3+} ion in J is:
- $-\frac{4}{9}x$
 - $-x$
 - $-\frac{x}{9}$
 - $-4x$

- 68 Which reaction is NOT a redox reaction?
- $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2NaCl$
 - $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
 - $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$
 - $H_2 + Cl_2 \rightarrow 2HCl$

- 69 Identify the correct reagents that would bring about the following transformation.
- C1=CC=C(C=C1)C=C \rightarrow C1=CC=C(C=C1)C=O
- H_2O/H^+
 - PCC
 - H_2O/H^+
 - CrO_3
 - BH_3
 - H_2O_2/OH^-
 - PCC
 - BH_3

- 70 On heating, some solid substances change from solid to vapour state without passing through liquid state. The technique used for the purification of such solid substances based on the above principle is known as
- Chromatography
 - Crystallization
 - Sublimation
 - Distillation

- 71 Match List I with List II.
- | | |
|-----------------------------|------------------------------------|
| List I (Complex) | List II (Type of isomerism) |
| A. $[Co(NH_3)_5(NO_2)]Cl_2$ | I. Solvate isomerism |
| B. $[Co(NH_3)_5(SO_4)]Br$ | II. Linkage isomerism |
| C. $[Co(NH_3)_6][Cr(CN)_6]$ | III. Ionization isomerism |
| D. $[Co(H_2O)_6]Cl_3$ | IV. Coordination isomerism |
- Choose the correct answer from the options given below:
- A-II, B-IV, C-III, D-I
 - A-I, B-III, C-IV, D-II
 - A-I, B-III, C-IV, D-II
 - A-I, B-IV, C-III, D-II

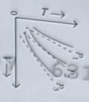
- 72 Given below are two statements:
- Statement I :** Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.
- Statement II :** $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic.
- In the light of the above statements, choose the correct answer from the options given below:
- Statement I is false but Statement II is true.
 - Both Statement I and Statement II are true.
 - Both Statement I and Statement II are false.
 - Statement I is true but Statement II is false.

- 73 Fehling's solution 'A' is
- aqueous sodium citrate
 - aqueous copper sulphate
 - alkaline copper sulphate
 - alkaline solution of sodium potassium tartrate (Rochelle's salt)

- 74 Intramolecular hydrogen bonding is present in
- HF
 - Oc1ccc(cc1)[N+](=O)[O-]
 - Oc1ccc(cc1)[N+](=O)[O-]
 - Oc1ccc(cc1)[N+](=O)[O-]

- 75
- Oc1ccc(cc1)[N+](=O)[O-]
 - Oc1ccc(cc1)[N+](=O)[O-]
 - Oc1ccc(cc1)[N+](=O)[O-]
 - Oc1ccc(cc1)[N+](=O)[O-]

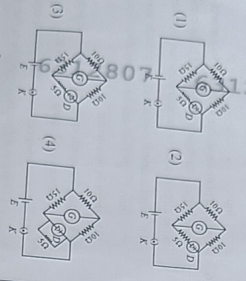
48 The following graph represents the PV curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1 , P_2 and P_3 compared with those of Charles's law represented as dotted lines.



Then the correct relation is:

- (1) $P_1 > P_2 > P_3$
- (2) $P_3 > P_2 > P_1$
- (3) $P_1 > P_3 > P_2$
- (4) $P_2 > P_1 > P_3$

49 Choose the correct circuit which can achieve the bridge balance.



50 An iron bar of length l has magnetic moment M . It is bent at the middle of its length such that the two arms make an angle of 60° with each other. The magnetic moment of this new magnet is:

- (1) M
- (2) M
- (3) $\frac{M}{2}$
- (4) $2M$

51 For the reaction $2A \rightleftharpoons B + C$, $K_c = 4 \times 10^3$ given time, the composition of reaction mixture is: $[A] = [B] = [C] = 0.10^3 \text{ M}$.

Then, which of the following is correct direction:

- (1) Reaction has gone to completion in forward direction.
- (2) Reaction is at equilibrium.
- (3) Reaction has a tendency to go in forward direction.
- (4) Reaction has a tendency to go in backward direction.

52 The highest number of helium atoms is in:

- (1) 2.271098 L of helium at STP
- (2) 4 mol of helium
- (3) 4 g of helium
- (4) 4 g of helium

53 A compound with a molecular formula of $C_{10}H_{18}$ has two tertiary carbons. Its IUPAC name is:

- (1) 2,2-dimethylbutane
- (2) n-hexane
- (3) 2-methylpentane
- (4) 2,3-dimethylbutane

54 Match List I with List II.

- List I (Conversion)
- A. 1 mol of H_2O to O_2
 - B. 1 mol of MnO_4^- to Mn^{2+}
 - C. 1.5 mol of Ca from molten $CaCl_2$
 - D. 1 mol of FeO to Fe_2O_3

- List II (Number of Faraday required)
- I. 3F
 - II. 2F
 - III. 1F
 - IV. 5F

Choose the correct answer from the options given below:

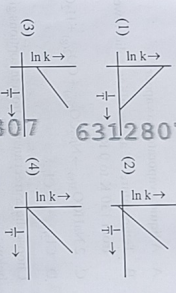
- (1) A-III, B-IV, C-II, D-I
- (2) A-II, B-IV, C-I, D-III
- (3) A-III, B-IV, C-I, D-II
- (4) A-I, B-III, C-I, D-IV

55 Arrange the following elements in increasing order of electronegativity: N, O, F, C, Si

Choose the correct answer from the options given below:

- (1) $F < O < N < C < Si$
- (2) $Si < C < N < O < F$
- (3) $Si < C < O < N < F$
- (4) $O < F < N < C < Si$

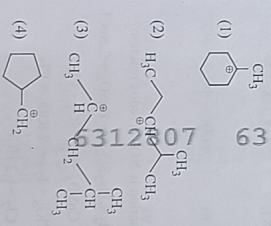
56 Which plot of $\ln k$ vs $\frac{1}{T}$ is consistent with Arrhenius equation?



57 In which of the following equilibria, K_p and K_c are NOT equal?

- (1) $2BrCl(g) \rightleftharpoons Br_2(g) + Cl_2(g)$
- (2) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
- (3) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$
- (4) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$

58 The most stable carbanion among the following is:

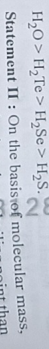


59 Activation energy of any chemical reaction can be calculated if one knows the value of:

- (1) rate constant at two different temperatures.
- (2) rate constant at standard temperature.
- (3) probability of collision.
- (4) orientation of reactant-molecules during collision.

60 Given below are two statements:

Statement I : The boiling point of hydrides of Group 16 elements follow the order

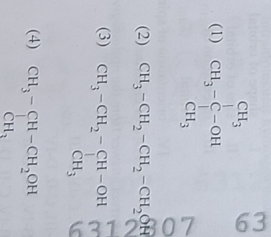


Statement II : On the basis of molecular mass, H_2O is expected to have lower boiling point than the other members of the group but due to the presence of extensive H-bonding in H_2O , it has higher boiling point.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Statement I is false but Statement II is true.
- (2) Both Statement I and Statement II are true.
- (3) Both Statement I and Statement II are false.
- (4) Statement I is true but Statement II is false.

61 Which one of the following alcohols reacts instantaneously with Lucas reagent?



31. A bob is whirled in a horizontal plane by means of a string with an initial speed of 10 rpm. The tension in the string is T . If speed becomes 2.0 times while keeping the same radius, the tension in the string becomes :

- (1) $\sqrt{2}T$ (2) T
 (3) $4T$ (4) $\frac{T}{4}$

32. A logic circuit provides the output Y as per the following truth table :

X	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is :

- (1) B (2) $AB + \bar{A}$
 (3) $\bar{A}\bar{B} + \bar{A}$ (4) \bar{B}

33. The maximum elongation of a steel wire of 1 m length if the elastic limit of steel and its Young's modulus, respectively, are $8 \times 10^8 \text{ N m}^{-2}$ and $2 \times 10^{11} \text{ N m}^{-2}$, is :

- (1) 8 mm (2) 4 mm
 (3) 0.4 mm (4) 40 mm

34. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is 0.075 Nm^{-1} , then the excess force required to take it away from the surface is :

- (1) 99 N (2) 19.8 mN
 (3) 198 N (4) 1.98 mN

35. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is 2400 g cm^2 . The length of the 400 g rod is nearly :

- (1) 72.0 cm (2) 8.5 cm
 (3) 17.5 cm (4) 20.7 cm

36. The minimum energy required to launch a satellite of mass m from the surface of earth of mass M and radius R in a circular orbit at an altitude $2R$ from the surface of the earth is :

- (1) $\frac{5GmM}{6R}$ (2) $\frac{5GmM}{6R}$
 (3) $\frac{2GmM}{3R}$ (4) $\frac{GmM}{2R}$

37. A force defined by $\vec{F} = \alpha r^2 + \beta r$ acts on a particle at a given time t . The factor which is dimensionless, if α and β are constants, is :

- (1) $\frac{d\beta}{dt}$ (2) $\frac{\beta}{\alpha}$
 (3) $\frac{\alpha}{\beta}$ (4) $\frac{\alpha t}{\beta}$

38. A sheet is placed on a horizontal surface in the presence of a strong magnetic field. A force is needed to hold the sheet there if it is magnetic. A. hold the sheet there if it is non-magnetic. B. move the sheet away from the pole when uniform velocity if it is conducting. C. move the sheet away from the pole when uniform velocity if it is both, non-conducting and non-polar. D. Choose the correct statement(s) from the options given below.

- (1) C only
 (2) B and D only
 (3) A and C only
 (4) A, C and D only

39. A $1.0 \mu\text{F}$ capacitor is connected to a $210 \text{ V}, 50 \text{ Hz}$ source as shown in figure. The peak current in the circuit is nearly ($\pi = 3.14$) :

- (1) 0.55 A (2) 0.58 A
 (3) 0.93 A (4) 1.20 A

40. A small telescope has an objective of focal length 140 cm and an eye piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is :

- (1) 52 (2) 34
 (3) 28 (4) 17

41. A metallic bar of Young's modulus, $0.5 \times 10^{11} \text{ N m}^{-2}$ and coefficient of linear thermal expansion $10^{-5} \text{ }^\circ\text{C}^{-1}$, length 1 m and area of cross-section 10^{-3} m^2 is heated from 0°C to 100°C without expansion or bending. The compressive force developed in it is :

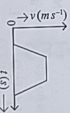
- (1) $2 \times 10^3 \text{ N}$ (2) $5 \times 10^3 \text{ N}$
 (3) $50 \times 10^3 \text{ N}$ (4) $100 \times 10^3 \text{ N}$

42. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then :

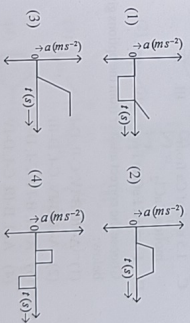
- A. the charge stored in it, increases.
 B. the energy stored in it, decreases.
 C. its capacitance increases.
 D. the ratio of charge to its potential remains the same.
 E. the product of charge and voltage increases.
 Choose the most appropriate answer from the options given below.

- (1) A, B and C only (2) A, B and E only
 (3) A, C and E only (4) B, D and E only

43. The velocity (v) - time (t) plot of the motion of a body is shown below :



The acceleration (a) - time (t) graph that best suits this motion is :



44. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is :

- (1) 2 : 3 (2) 1 : 1
 (3) 2 : 9 (4) 1 : 2

45. The property which is not of an electromagnetic wave travelling in free space is that :

- (1) they originate from charges moving with uniform speed.
 (2) they are transverse in nature.
 (3) the energy density in electric field is equal to energy density in magnetic field.
 (4) they travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$

46. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If it is the current in the circuit, then in the gap between the plates :

- (1) displacement current of magnitude greater than I flows but can be in any direction.
 (2) there is no current.
 (3) displacement current of magnitude equal to I flows in the same direction as I .
 (4) displacement current of magnitude equal to I flows in a direction opposite to that of I .

47. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{x}{2}$ times its original time period. Then the value of x is :

- (1) 4 (2) $\sqrt{3}$
 (3) $\sqrt{2}$ (4) $2\sqrt{3}$

Symbol and unit	List I (symbol/unit)	List II (symbol/unit)
r (radius)	I. 2^{-1}	2^{-1}
x (amplitude)	II. $0 < x < 2^{-1}$	$0 < x < 2^{-1}$
λ (wavelength)	III. $x > 2^{-1}$	$x > 2^{-1}$
ν (frequency)	IV. $0 < \nu < x$ (small positive number)	$0 < \nu < x$ (small positive number)
ω (angular frequency)		

- Choose the correct answer from the options given below.
- Reason: A, B, III, C, II, D, I
 (1) A, I, B, III, C, II, D, I
 (2) A, I, B, III, C, II, D, I
 (3) A, I, B, III, C, II, D, I
 (4) A, III, B, I, C, I, D, I

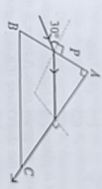


18. Consider the following statements A and B and identify the correct answer:
- A. For a slab with thickness t and refractive index n , the vertical displacement d of a ray incident at an angle i is given by $d = t \sin i (1 - \frac{1}{n})$.
- B. In a reverse biased $p-n$ junction diode, the current measured in i is due to majority charge carriers.
- (1) Both A and B are incorrect.
 (2) A is correct but B is incorrect.
 (3) A is incorrect but B is correct.
 (4) Both A and B are correct.
19. Given below are two statements Statement I: Atoms are electrically neutral as they contain equal number of positive and negative charges.
 Statement II: Atoms of each element are stable and emit their characteristic spectrum.
 In the light of the above statements, choose the most appropriate answer from the options given below:
 (1) Statement I is incorrect but Statement II is correct.
 (2) Both Statement I and Statement II are correct.
 (3) Both Statement I and Statement II are incorrect.
 (4) Statement I is correct but Statement II is incorrect.

20. In a vernier calipers, $(N+1)$ divisions of Vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is:
 (1) $10(N+1)$ (2) $10N$
 (3) $\frac{1}{100(N+1)}$ (4) $100N$
21. In an ideal transformer, the turns ratio is $\frac{N_p}{N_s} = \frac{1}{2}$. The ratio $V_p : V_s$ is equal to (the symbol ϵ_0 has their usual meaning):
 (1) 1 : 4 (2) 1 : 2
 (3) 2 : 1 (4) 1 : 1
22. An unpolarised light beam strikes a glass surface at Brewster's angle. Then
 (1) the reflected light will be completely polarised but the refracted light will be partially polarised.
 (2) the reflected light will be partially polarised.
 (3) the refracted light will be completely polarised.
 (4) both the reflected and refracted light will be completely polarised.
23. Match List I with List II.
- | | |
|--|--------------------|
| List I | List II |
| (Spectral Lines of Hydrogen from transitions from) | (Wavelengths (nm)) |
| A. $n_2 = 3, n_1 = 2$ | I. 410.2 |
| B. $n_2 = 4, n_1 = 2$ | II. 434.1 |
| C. $n_2 = 5, n_1 = 2$ | III. 656.3 |
| D. $n_2 = 6, n_1 = 2$ | IV. 486.1 |
- Choose the correct answer from the options given below:
 (1) A-I, B-II, C-III, D-IV
 (2) A-II, B-I, C-IV, D-III
 (3) A-III, B-IV, C-II, D-I
 (4) A-IV, B-III, C-I, D-II

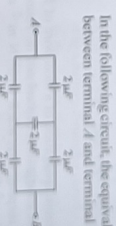
24. A wire of length ' l ' and resistance 100Ω is divided into 10 equal parts. The next 5 parts are connected in series while the next 5 parts are again connected in series. The resistance of this final combination is:
 (1) 60Ω (2) 26Ω
 (3) 52Ω (4) 55Ω

25. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC . The refractive index of the prism is:
 (1) $\frac{\sqrt{3}}{2}$ (2) $\frac{\sqrt{5}}{4}$
 (3) $\frac{\sqrt{5}}{2}$ (4) $\frac{\sqrt{3}}{4}$



26. A particle moving with uniform speed in a circular path maintains:
 (1) varying velocity and varying acceleration.
 (2) constant velocity.
 (3) constant acceleration.
 (4) constant velocity but varying acceleration.
27. $^{230}\text{X} \xrightarrow{\alpha} \text{Y} \xrightarrow{\beta} \text{Z} \xrightarrow{\beta} \text{P} \xrightarrow{\alpha} \text{Q}$
 In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are:
 (1) 286, 81 (2) 280, 81
 (3) 286, 80 (4) 288, 82

28. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
 Assertion A: The potential (V) at any axial point at 2 m distance (r) from the centre of the dipole of dipole moment vector \vec{p} of magnitude, $4 \times 10^{-6} \text{ C m}$, is $\pm 9 \times 10^3 \text{ V}$.
 Reason R: $V = \pm \frac{2p}{4\pi\epsilon_0 r^2}$, where ' r ' is the distance of any axial point, situated at 2 m from the centre of the dipole.
 In the light of the above statements, choose the correct answer from the options given below:
 (1) A is false but R is true.
 (2) Both A and R are true and R is the correct explanation of A.
 (3) Both A and R are true and R is NOT the correct explanation of A.
 (4) A is true but R is false.



29. In the following circuit, the equivalent capacitance between the terminal A and terminal B is:
 (1) $4 \mu\text{F}$ (2) $2 \mu\text{F}$
 (3) $1 \mu\text{F}$ (4) $0.5 \mu\text{F}$
30. If v is the velocity of light in free space, the correct statements about photon among the following are:
 A. The energy of a photon is, $E = hv$.
 B. The velocity of a photon is c .
 C. The momentum of a photon, $p = \frac{hv}{c}$.
 D. In a photon-electron collision, both total energy and total momentum are conserved.
 E. Photon possesses positive charge.
 Choose the correct answer from the options given below:
 (1) A, B, D and E only
 (2) A and B only
 (3) A, B, C and D only
 (4) A, C and D only

A wheel of a hollow cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct? (P and Q are any highest and lowest points on the wheel, respectively?)



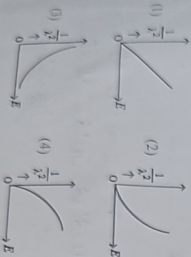
- (1) Point P has zero speed.
- (2) Point P moves slower than point Q .
- (3) Point P moves faster than point Q .
- (4) Both the points P and Q move with equal speed.

2 The output (Y) of the given logic gate is similar to the output of an/a :

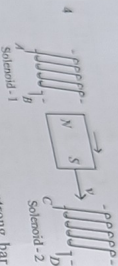


- (1) AND gate
- (2) NAND gate
- (3) NOR gate
- (4) OR gate

3 The graph which shows the variation of $\left(\frac{1}{\lambda^2}\right)$ and its kinetic energy, E_k (where λ is de Broglie wavelength of a free particle) :

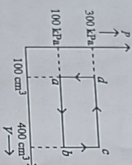


53 English 1



- 4 In the above diagram, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions:
- (1) BA and DC
 - (2) AB and DC
 - (3) BA and CD
 - (4) AB and CD

5 A thermodynamic system is taken through the cycle $abcd$. The work done by the gas along the path bc is :



- (1) $-60 J$
- (2) zero
- (3) $30 J$
- (4) $-90 J$

6 Two bodies A and B of same mass undergo completely inelastic one dimensional collision. The body A moves with velocity v_1 while body B is at rest before collision. The velocity of the system after collision is v_2 . The ratio $v_1 : v_2$ is :

- (1) 1:4
- (2) 1:2
- (3) 2:1
- (4) 4:1

7 At any instant of time t , the displacement of any particle is given by $2t - t^2$ (SI unit) under the influence of force of $5N$. The value of instantaneous power is (in SI unit):

- (1) 6
- (2) 10
- (3) 5
- (4) 7

53 English 1

8 A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is :



- (1) zero
- (2) 3×10^5
- (3) 1×10^5
- (4) 0.5×10^5

9 A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as $4\pi \times 10^{-7}$ SI units):

- (1) 44 T
- (2) 44 mT
- (3) 4.4 T
- (4) 4.4 mT

10 If the monochromatic source in Young's double slit experiment is replaced by white light, then

- (1) all bright fringes will be of equal width.
- (2) interference pattern will disappear.
- (3) there will be a central dark fringe surrounded by a few coloured fringes.
- (4) there will be a central bright white fringe surrounded by a few coloured fringes.

11 The quantities which have the same dimensions as those of solid angle are :

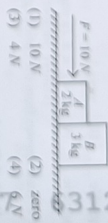
- (1) angular speed and stress
- (2) strain and angle
- (3) stress and angle
- (4) strain and arc

12 The mass of a planet is $\frac{1}{10}$ that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is :

- (1) 3.92 m s^{-2}
- (2) 19.6 m s^{-2}
- (3) 9.8 m s^{-2}
- (4) 4.9 m s^{-2}

53 English 1

13 A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3 kg respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is :



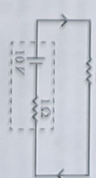
- (1) 10 N
- (2) zero
- (3) 4 N
- (4) 6 N

14 In a uniform magnetic field of 0.049 T , a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is $9.8 \times 10^{-6} \text{ kg m}^2$. If the magnitude of magnetic moment of the needle is $x \times 10^{-5} \text{ Am}^2$, then the value of 'x' is :



- (1) $1280 \pi^2$
- (2) $64 \pi^2$
- (3) $128 \pi^2$
- (4) $32 \pi^2$

15 The terminal voltage of the battery, whose emf is 10 V and internal resistance is 1Ω , when connected through an external resistance of 4Ω as shown in the figure is :



- (1) 10 V
- (2) 7 V
- (3) 6 V
- (4) 8 V

16 If $x = 5 \sin\left(\pi t + \frac{\pi}{3}\right) \text{ m}$ represents the motion of a particle executing simple harmonic motion, the amplitude and time period of motion, respectively, are :

- (1) 5 m , 1 s
- (2) 5 cm , 2 s
- (3) 5 m , 2 s
- (4) 5 cm , 1 s

1 Contd...