Test Booklet Code

Q1

OBAMA

No. : 3434556

This Booklet contains 28 pages.

Do not open this test Booklet until you are asked to do so.

Important Instructions :

1. 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.
2. The test is of 3 hour 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:

   (a) 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.

   (b) 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. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer sheet 100). 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.**
3. 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.**
4. Use **Blue/ Black Ball Point Pen only** for writing particulars on this page/ marking responses on Answer Sheet.
5. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
6. Syllabus of this test is:
   - Physics: (1) Electric Charges & Fields (2) Electrostatic Potential & Capacitance (3) Current Electricity
   - Chemistry: (4) Organic Chemistry: Some Basic Principles & Techniques (5) Hydrocarbons (6) Haloalkanes & Haloarenes
   - Biology: (7) Sexual Reproduction in Flowering Plants (8) Human Reproduction (9) Reproductive Health (10) Reproduction in Organisms
7. The CODE for this Booklet is **Q1. 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.
8. 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.
9. Use of white fluid for correction is NOT permissible on the Answer Sheet.
10. Each candidate must show on-demand his /her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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.**
13. Use of Electronic/ Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. Since you are writing this test at home, you will be tempted to CHEAT. It is completely your wish. Enough evidence exists that those who CHEAT in Mock Tests are cheating themselves and ultimately, do not gain anything. We strongly RECOMMEND that you ask your parents or siblings to become an invigilator and sit next to you so that natural tendency to CHEAT is taken care off!!

Name of the Candidate (in Capitals) : _____

Roll Number **: in figures** _____

: in words _____

Centre of Examination (in Capitals) : _____

Candidate's Signature : _____ **Invigilator's Signature :** _____

Facsimile signature stamp of Centre Superintendent : _____

BOTANY - SECTION A

1 In double fertilization in flowering plants :

A. One of the male gametes moves towards the egg cell and fuses with its nucleus, thus completing syngamy
B. Endosperm develops
C. It results in the formation of a diploid cell, zygote
D. The other male gamete moves towards the two polar nuclei located in the central cell and fuses with them to produce PEN
E. Syngamy and triple fusion takes place in the embryo sac

Choose the correct answer from the options given below:

1. A, B, D, E only
2. A, C, D, E only
3. A & D only
4. A, C, D only

2 Choose the correct match w.r.t. ploidy level in angiosperms :

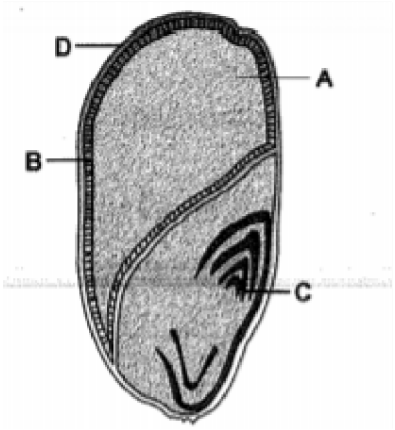
1. Synergids - Triploid (3n)
2. Antipodal cells - Triploid (3n
3. Secondary nucleus- Diploid (2n)
4. Egg cell - Diploid (2n)

3 Match the following :

I) External fertilization	i) pollen grain
II) Androecium	ii)anther wall
III) Male gametophyte	iii)algae
IV) Primary parietal layer	iv)stamens

1. I-iv;II-i;III-ii;IV-iii
2. I-iii;II-iv;III-i;IV-ii
3. I-iii;II-iv;III-ii,IV-i
4. I-iii;II-i;III-iv;IV-ii

4 Identify the labels A, B, C and D in the figure given below :



1. A - endosperm; B - scutellum; C - plumule; D - seed coat
2. A - aleurone; B - endosperm; C - radicle; D - coleorhiza
3. A - epithelium; B - aleurone; C - plumule; D - seed coat
4. A - endosperm; B - aleurone; C - plumule; D - seed coat and fruit wall

5 Which of the following statements is not correct?

1. Insects that consume pollen or nectar without bringing about pollination are called pollen nectar robbers
2. Pollen germination and pollen tube growth are regulated by chemical compound of pollen interacting with those of the pistil
3. Some reptiles have also been reported as pollinators in some plant species
4. Pollen grains of many species can germinate on the stigma of a flower, but only one pollen tube of the same species grows into the style.

6 What is not correct regarding apomixis?

1. It is production of seeds without fertilization
2. It is a form of asexual reproduction
3. It is fruit production without fertilization
4. Nucellar cells developing into embryos is an example

7 Regarding pollination:

1. Xenogamy is the only type which brings genetically different types of pollen grains to the stigma
2. Majority of plants use abiotic agents for pollination
3. All aquatic plants are pollinated by water
4. Geitonogamy is genetically similar to cross pollination

8 Which one of the following statement is incorrect?

1. The generative cell divides during the growth of pollen tube in the stigma
2. In some species, floral rewards are in providing safe places to lay eggs
3. The embryo development precedes endosperm development
4. Scutellum is lateral to the embryonal axis in grass family

9 **Assertion (A) :** Cleistogamous flowers produce assured seed set even in the absence of pollinators.
Reason (R) : Cleistogamous flowers are invariably geitonogamous.

1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false and (R) is false

10 Which of the following prevents inbreeding depression?

1. Pollen is released and stigma becomes receptive at the same time
2. Presence of bisexual flowers
3. Presence of self-incompatibility
4. Anther and stigma are placed at the same positions

11 In pear, cashew-nut and strawberry plants :

1. Simple dry fruits are present
2. True fruits are present
3. Aggregate fruits are present
4. Edible part of the fruit is fleshy thalamus

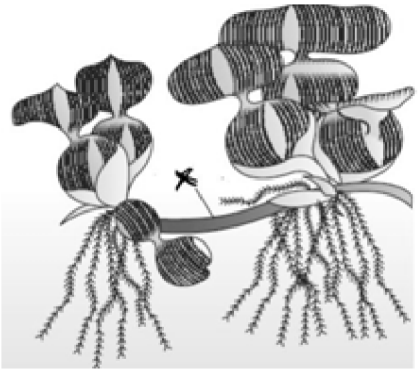
12 Select the disadvantage of asexual reproduction from the options given below :

1. Only single parent is required
2. It is a rapid mode of reproduction
3. Gamete formation may or may not be present
4. It does not contribute to genetic variability and plays no significant role in the evolution

13 Select the correct sequence of events.

1.	Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
2.	Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Organogenesis → Cell differentiation
3.	Gametogenesis → Syngamy → Gamete transfer → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
4.	Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell differentiation → Cell division (Cleavage) → Organogenesis

14 Identify X



1. Stem
2. Runner
3. Offset
4. Bud

15 Match Column I with column II and select the correct option using the codes given below :

	Column I		**Column II**
A.	Pistils fused together	1.	Gametogenesis
B.	Formation of gametes	2.	Pistillate
C.	Hyphae of higher ascomycetes	3.	Syncarpous
D.	Unisexual female flower	4.	Dikaryotic

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

16 Which one of the following statements regarding post-fertilization development in flowering plants is incorrect?
1. Ovules develop into an embryo sac
2. Ovary develops into fruit
3. Zygote develops into an embryo
4. Central cell develops into endosperm

17 Assertion (A): Reproduction enables the continuity of species, generation after generation
Reason (R): It is a biological process in which an organism gives rise to young ones similar to itself
In the light of above statements, choose the correct answer from the options given below
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false, (R) is true

18 **Assertion (A) :** Pollen grains can be stored for years at 196˚C temperature.
Reason (R) : Stored pollens can be used as seed banks.
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false and (R) is false

19 Seed plants where separate male and female cones or flowers are present on the same plant are called as:
1. staminate
2. pistillate
3. dioecious
4. monoecious

20 The innermost layer of the anther wall in angiosperms plant is
1. Tapetum, and it nourishes the developing pollen grains
2. Endothecium, and it nourishes the developing pollen grains
3. Tapetum, and its cells possess thin cytoplasm and uninucleate condition
4. Endothecium, which protects and nourishes the pollen grains

21 What is common between vegetative reproduction and Apomixis ?
1. Both produce progeny identical to the parent
2. Both are applicable to only dicot plants
3. Both bypass the flowering phase
4. Both occur round the year

22 Asexual reproduction mimics sexual reproduction when
1. Seed formation occurs without fertilization
2. Thalamus is associated with fruit
3. Pseudocarpic fruits are formed
4. There is no fruit formation

23 Which one of the following statements is correct with respect to endosperm development? It originates :
1. from the fusion product of three haploid nuclei - one from male gametophyte and two from the female gametophyte
2. from the fusion product of three haploid nuclei - two from male gametophyte and one from the female gametophyte
3. from the fusion product of two haploid nuclei - one from male gametophyte and one from the female gametophyte
4. by a phenomenon called apomixis

24 Match the following:

1. Zoospores	P- Yeast
2. Conidia	Q- *Amoeba*
3. Buds	R- *Chlamydomonas*
4. Gemmules	S- *Penicillium*
5. Budding	T- *Hydra*
6. Binary fission	U- Sponge

1.1-R, 2-S, 3-T, 4-U, 5-P, 6-Q
2.1-P, 2-Q, 3-U, 4-T, 5- S, 6-R
3. 1-R, 2-S, 3-T, 4-P, 5-Q, 6-U
4.1-R, 2-S, 3-U, 4-T, 5-P, 6-Q

25 After pollination, which of the following events is crucial for fertilization to occur in flowering plants?
1. Sperm swim to the egg and the polar nuclei.
2. Petals close around the reproductive parts.
3. Meiosis occurs within the pollen grain.
4. A pollen tube grows from the stigma to the ovule.

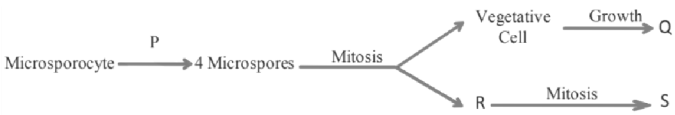
26 Choose the incorrect option w.r.t. nucellus :
1. Possesses abundant reserve food material
2. Generally differentiate a single megaspore mother cell
3. It represents microsporangium
4. It is enclosed within integuments

27 Which of the following statements is wrong?
1. Flies and beetles visit white flowers with a sweet fragrance
2. Floral rewards are usually pollen and nectar
3. Pollen grains are protected from wetting by mucilage covering in certain groups
4. Anemophilous flowers have generally single ovule in the ovary

28 **Assertion (A) :** An ovule generally gas a 7-nucleated and 8-celled embryo sac formed from megaspore through reduction division.
Reason (R) : Embryo sac is a diploid structure.
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false and (R) is false

29 From among the sets of terms given below, identify those that are associated with the gynoecium :
1. Stigma, ovule, embryo sac, placenta
2. Thalamus, pistil, style, ovule
3. Ovule, ovary, embryo sac, tapetum
4. Ovule, stamen, ovary, embryo sac

30 Find the right combination for P, Q, R and S with respect to gametophyte development in flowering plants.



1. P-Meiosis, Q-Generative cell, R-Pollen Tube, S-2 Sperm Cells
2. P-Meiosis, Q-Pollen Tube, R-Generative Cell, S-2 Sperm Cells
3. P-Mitosis, Q-Generative Cell, R-Pollen Tube, S-2 Sperm Cells
4. P-Growth, Q-2 Sperm Cells, R-Pollen Tubes, S-Generative Cell

31 Read the two statements A & B given below and select the correct option :
A- Embryo sac of angiosperms is a 7 celled structure.
B – Embryo sac has three synergid cells.
1. Both A and B are correct
2. Both A and B are incorrect
3. Only A is correct
4. Only B is correct

32 Assertion (A): Hybrids are widely used in cultivation to increase productivity and apomixes can be an important tool for maintaining hybrid nature.
Reason (R): Seeds produced by apomictic plants are identical to mother plant as there is no segregation
Mark the correct option :
1. Both (A) & (R) are true and (R) is the correct explanation of (A).
2. Both (A) & (R) are true but (R) is not the correct explanation of (A).
3. (A) is true statement but (R) is false.
4. Both (A) and (R) are false statements.

33 Which of the following is/are NOT developed from ovary?
A. Apple
B. Tomato
C. Mango
D. Coconut
E. Cashewnut
Choose the correct answer from the options given below:
1. A and B only
2. A only
3. A, C and D only
4. A and E only

34 Select the odd one out w.r.t. asexual reproduction :
1. Gamete formation can occur
2. Involvement of only one parent
3. Gametic fusion is absent
4. Morphologically and genetically, different individuals are produced

35 Emasculation is a process of
1. Removal of female part from the flower
2. Removal of male part from the flower
3. Removal of all axillary buds from the plant
4. Removal of both types of sex organs from the flower

BOTANY - SECTION B

36 Water hyacinth is one of the most invasive weeds primarily because:
1. It gets adapted to any fresh water body easily
2. It produces secondary metabolites against herbivores
3. It can propagate vegetatively at a phenomenal rate
4. It is predated upon by a large number of organisms

37 Read the following statements :
a. Free nuclear division in developing embryo sac.
b. Free nuclear division in PEN.
c. Formation of heterogametes in *Fucus*.
d. Chemotactic movement of sperms in *Marchantia*.
e. Germination of seed within fruit when fruit is still attached to mother plant.
How many of the above statements represent post-fertilization development?
1. Two
2. Three
3. Four
4. One

38 Seeds offer which of the following advantages to angiosperms?
1. Show better dispersal strategies
2. Dormancy of seed allows it to be utilized as food source throughout the year
3. Forms the basis of agriculture
4. Asexual seed development allows the hybrid seed to maintain their superior characters

39 Match each item in Column I with one in Column II and select the correct match from the codes given:

	COLUMN I		**COLUMN II**
A	Asexual reproductive structure in *Penicillium*	P	Conidia
B	Vegetative propagule in *Agave*	Q	*Marchantia*
C	Monoecious plant	R	*Chara*
D	Dioecious plant	S	Bulbil

Codes:

	A	B	C	D
1.	P	S	Q	R
2.	S	P	Q	R
3.	P	S	R	Q
4.	S	P	R	Q

40 Assertion (A): The megaspore mother cell divide mitotically to produce four spores.
Reason (R): Megaspore mother cells are diploid and megaspore is haploid.
Mark the correct option :
1. Both (A) & (R) are true and (R) is the correct explanation of (A).
2. Both (A) & (R) are true but (R) is not the correct explanation of (A).
3. (A) is true statement but (R) is false.
4. Both (A) and (R) are false statements.

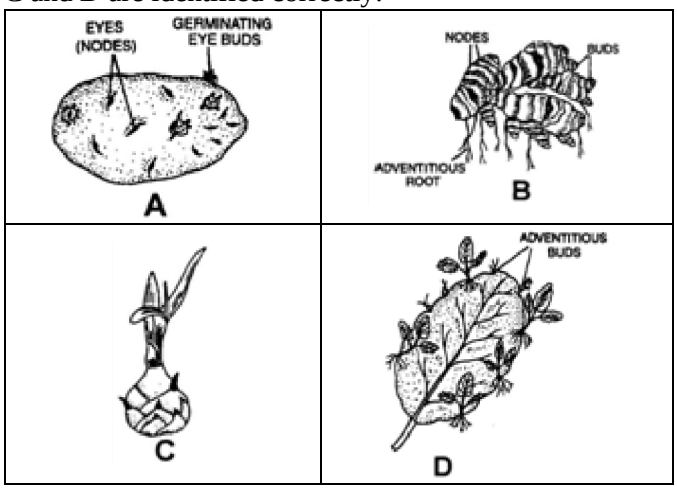
41 **Assertion (A) :** No enzyme that degrades sporopollenin is so far known.
Reason (R) : It is one of the most resistant organic material of megaspore.
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false and (R) is false

42 During the development of most common type of endosperm in flowering plants :
1. PEN divides meiotically without wall formation
2. Each karyokinesis is followed by wall formation
3. Wall formation begins after achieving a multinucleate condition
4. PEN divides mitotically and results into haploid nuclei

43 Zygote is dormant for some time in a fertilized ovule because
1. Moisture and oxygen are adequate
2. Nutrition source is not developed
3. It has a thick, desiccation resistant wall
4. It is a vital link to ensure continuity of species

44 **Assertion (A):** Nocturnal flowers are pollinated by moths.
Reason (R): Nocturnal flowers are highly fragrant and dull in colour
In the following questions a statement of assertion (A) is followed by a statement of reason (R).
1. Both (A) and (R) are true and (R) is the correct explanation of (A)
2. Both (A) and (R) are true and (R) is not the correct explanation of (A)
3. (A) is true, (R) is false
4. (A) is false and (R) is false

45 Examine the figures given below and select the right options out of (a - d); in which all the 4 items A, B, C and D are identified correctly:



	A	B	C	D
1.	Tuber	Offset	Sucker	Leaf buds
2.	Offset	Sucker	Stolon	Leaf buds
3	Offset	Sucker	Stolon	Leaf buds
4.	Tuber	Rhizome	Bulbil	Leaf buds

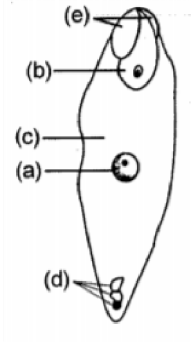
46 Mark the mis-matched pair

1. Polycarpic plants - Recovery phase
2. Offset - Water hyacinth
3. *Marchantia* - Monoecious plant
4. Bulbil - *Agave*

47 Recent research has shown that pollination requires that carpels recognize pollen grains as "self or nonself." For self-incompatibility, the system requires

1. the rejection of nonself cells
2. the rejection of self cells.
3. carpel incompatibility with the egg cells.
4. that the flowers be incomplete.

48 The figure given below shows fertilised embryo sac of the flowering plants. Which one set of two parts out of (a - e) have been correctly identified?



1. (a) - Nucleolus:
(c) - Primary endosperm nucleus
2. (e) - Degenerating antipodal cells and zygote;
(d) - Degenerating synergids
3. (b) - Zygote;
(a) - Central cell
4. (c) - Primary endosperm cell;
(e) - Degenerating synergids

49 The plant parts which consist of two generations, one within the other, are:

(a) Pollen grains inside the anther
(b) Germinated pollen grain with two male gametes
(c) Seed inside the fruit
(d) Embryo sac inside the ovule

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

50 Which process is matched with a valid example?

Process	Example
1. seed dispersal	a stamen explodes in the wind
2. fertilization	a nucleus from the pollen grain fuses with a nucleus in the ovule
3. fertilization	a bee carries pollen from flower to flower
4. pollination	seeds are blown from a flower onto another one by the wind

ZOOLOGY - SECTION A

51 Which of the following is observed in human foetus during the 5th month of pregnancy?
1. Movements of the foetus and fine hair on the head
2. Eyelids are formed as eyelashes get separated
3. Heart is formed but does not start its function
4. Organs are formed without formation of major organ systems

52 Assertion(A): In humans, all copulations cannot lead to fertilisation and pregnancy
Reason (R): Ferrtilisation can only occur if the ovum and sperms are transported simultaneously to the ampulla
In the light of above statement, choose the correct answer from the options given below :
1. Both (A) and (R) are true and (R) is not the correct explanation of (A)
2. Both (A) and (R) are true and (R) is the correct explanation of (A)
3. (A) is true but (R) is false
4. (A) is false but (R) is true

53 Select the mismatch w.r.t. methods of contraception :
1. Coitus interrupts - Natural method
2. Condom - Physical barrier
3. Tubectomy - Sterilization
4. Lippes loop - Medicated IUD

54 Sexually transmitted infections cannot spread through
(a) Using unsterile surgical instruments
(b) Infected mother to foetus
(c) Kissing
(d) Inheritance
(e) Transfusion of blood from infected persons
(f) Using sterile needles
(g) Infected foetus to mother
Choose the correct answer from the options given below :
1. (a), (b) and (c)
2. (c), (d), (f) and (g)
3. (b), (c) and (d)
4. (d), (e), (f) and (g)

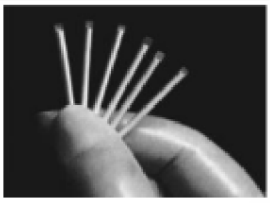
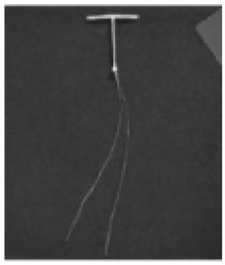
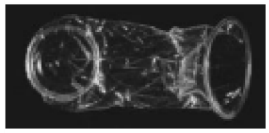
55 Select the incorrect match:

1.	Nebenkern	Spiral mitochondria in human sperm
2.	Distal centriole	Axial filament
3.	Proximal centriole	Forms tail
4.	-Semen	Seminal plasma along with sperms

56 Identify the incorrectly matched pair:

1.	Length of Testis	4 to 5 cm
2.	Width of testis	2 to 3 cm
3.	Length of ovary	5 to 6 cm
4.	Length of fallopian tube	10 to 12 cm

57 Match column I with column II and select the correct option :

	Column I		Column II
a.		(i)	Implant
b.		(ii)	Copper T
c.		(iii)	Condom for male
d.		(iv)	Condom for female

1. a(iv), b(iii), c(ii), d(i)
2. a(iii), b(i), c(ii), d(iv)
3. a(ii), b(i), c(iii), d(iv)
4. a(iii), b(ii), c(i), d(iv)

58 Identify the incorrect statement regarding surgical birth control methods :
1. They are also called sterilisation procedures
2. In males, it is termed as vasectomy and in females, it is called tubectomy
3. They are terminal methods to prevent any more pregnancies
4. These methods are irreversible

59 For normal fertility, what percent of the sperm in ejaculate must exhibit normal morphology?
1. 20
2. 30
3. 40
4. 60

60 How many structures given below are included in external genitalia of human females?
Mons pubis, labia majora, labia minora, hymen, vagina, clitoris, oviduct, uterus
1. 7
2. 5
3. 3
4. 1

61 Read the following statements carefully.
Statement-A: An ideal contraceptive should be user-friendly, easily available, effective and irreversible with no or least side-effects.
Statement-B: An ideal contraceptive should in no way interfere with the sexual drive, desire and/or sexual act of the user.
Select the correct option regarding the above-given statements.
1. Both statements A and B are incorrect
2. Only statement A is correct
3. Only statement B is correct
4. Both statements A and B are correct

62 Statutory ban on amniocentesis in India was necessary because:
1. It is very expensive.
2. It can tell about chromosomal aberrations.
3. It is an invasive procedure and carries high-risk abortions.
4. It can be used for pre-natal sex determination of the foetus leading to female foeticides.

63 Identify the incorrectly matched pair:

1.	Ovulation	LH surge
2.	Follicular phase of menstrual cycle	Regeneration of endometrium
3.	Luteal phase	Secretion of FSH
4.	Menstruation	Withdrawal of progesterone

64 All of the following are important components of initiation of parturition in humans except
1. Foetal ejection reflex
2. Release of prolactin from rostral hypophysis
3. Increase in estrogen and progesterone ratio
4. Release of oxytocin from maternal neurohypophysis

65 Choose the correct statement w.r.t. reproduction in humans :
1. Fertilization can only occur if the ovum and sperms are transported simultaneously through uterus to the ampullary-isthmic
junction.
2. During fertilization, sperm which comes in contact with zona pellucida induces changes in the membrane that facilitate the entry of additional sperms.
3. All copulations do not lead to fertilization and pregnancy.
4. In fallopian tubes, the second meiotic division is also unequal and results in the formation of secondary oocyte and 2nd polar body.

66 Choose the correct match :

1.	Proliferative phase	-	Mature follicle develops into corpus luteum
2.	Secretory phase	-	Rapid regeneration of myometrium
3.	Ovulatory phase	-	Release of ovum and corpus luteum from mature follicle
4.	Pregnancy	-	All events of menstrual cycle stop

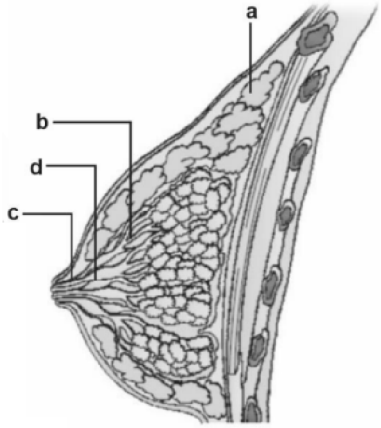
67 A fluid-filled cavity called as ‘antrum’ is characteristically seen in a :
1. Secondary follicle
2. Tertiary follicle
3. Morula
4. Blastocyst

68 Read the following statements A and B. Choose the correct answer from the options given below :
Statement A: The ovulatory phase is followed by luteal phase during which the remaining parts of the Graffian follicle transforms into the corpus luteum
Statement B: Cyclic menstruation is an indicator of normal reproductive phase and extends between menarche and menopause
1. Both statements A and B are correct
2. Both statements A and B are incorrect
3. Only statement A is correct
4. Only statement B is correct

69 Progestogens alone or in combination with estrogen can also be used as contraceptives by females as implants under the skin. When used in this manner, they are beneficial as they
1. Do not affect the release of the ovum
2. Induce a foreign body reaction leading to rejection of the implanted blastocyst
3. Can cause ectopic pregnancy
4. Have a much longer effective period

70 How many of the following are features of 'Nirodh'?
(a) Is a natural method of contraception
(b) Is similar to LNG-20 in its mechanism of action
(c) Can be self-inserted by males
(d) Is a barrier method of contraception
Select the correct option for the above given question.
1. One
2. Two
3. Three
4. Four

71 A diagrammatic sectional view of the mammary gland is shown in the following figure. Identify labellings a, b, c, and d. Choose the option which represents a, b, c, and d correctly.



	a	b	c	d
1.	Fat	Ampulla	Mammary duct	Lactiferous duct
2.	Fat	Mammary duct	Lactiferous duct	Ampulla
3.	Alveoli	Mammary tubule	Ampulla	Lactiferous duct
4.	Alveoli	Mammary tubule	Lactiferous duct	Ampulla

72 Match Column-I with Column-II and select the correct option using the codes given below :

	Column-I		Column-II
a.	Clitoris	(i)	Antrum
b.	Tertiary follicle	(ii)	Golgi body
c.	Inner cell mass	(iii)	Homologous to penis of male
d.	Acrosome	(iv)	Stem cells

1. a(i), b(ii), c(iii), d(iv)
2. a(iv), b(iii), c(ii), d(i)
3. a(iii), b(i), c(iv), d(ii)
4. a(ii), b(iv), c(i), d(iii)

73 Which of the following is incorrect regarding vasectomy?
1. No sperm will be found in seminal fluid
2. No sperm will be found in epididymis
3. Vasa deferentia is cut and tied
4. Reversibility is very poor

74 A couple is planning to take the help of ART to have children. The wife is normal and healthy and wants in vivo fertilisation. The husband has low sperm count in his ejaculate. They proceed with the ART and the woman gets pregnant. The procedure they underwent is 'X'. Which option from the following can be 'X'?
1. ICSI or AI
2. GIFT or IUI
3. IUT or IUI
4. AI or IUI

75 Cu^{++} released from copper releasing intra uterine devices :
1. Makes uterus unsuitable for implantation
2. Increases phagocytosis of sperms
3. Suppresses sperm mobility
4. Prevents discharge of ova from ovary

76 Which of the following is correct for MTP?
1. It is induced abortion
2. It is spontaneous abortion
3. It is aimed at increasing female foeticide
4. Its full form is 'Medical Transformation of Pregnancy'

77 LH surge:
1. is a dramatic sudden increase in the levels of LH during the early part of menstrual cycle and is responsible for ovulation.
2. is a dramatic sudden decrease in the levels of LH during the early part of menstrual cycle and is responsible for ovulation.
3 is a dramatic sudden decrease in the levels of LH during the mid-menstrual cycle and is responsible for ovulation.
4. is a dramatic sudden increase in the levels of LH during the mid-menstrual cycle and is responsible for ovulation.

78 What happens to the majority of the follicles during the phase from birth to puberty?
1. They get invested by multiple layers of granulosa cells
2. They enlarge in size and then get dormant
3. They undergo atresia or degeneration
4. They cluster together at one end of the ovary

79 When two parents participate in the reproductive process and also involve _____A_____ of ____B_____ , it is called sexual reproduction. Choose the option which fills the blanks A and B correctly.

	A	B
1.	Isolation	Male and female gametes
2.	Fusion	Male gametes
3.	Gametogenesis	Only female gametes
4.	Fusion	Male and female gametes

80 What causes the onset of puberty in males?
1. Increase in secretion of testosterone by testis
2. Decrease in secretion of testosterone by testis
3. Increase in secretion of GnRH by hypothalamus
4. Decrease in secretion of GnRH by hypothalamus

81 Read the following statements A and B and choose the correct answer from the options given below :
Statement-A: High concentration of estrogens will eventually cause release of ovum from the Graafian follicle
Statement-B: In human beings, most of the major organ systems are formed by the end of first trimester
1. Both statement A and B are correct
2. Both statements A and B are incorrect
3. Only statement A is correct
4. Only statement B is correct

82 In sexually reproducing organisms which of the following events can normally be regarded as most 'critical'?
1. Gametogenesis
2. Gamete transfer
3. Fertilization
4. Embryogenesis

83 In the absence of fertilization:
1. the zona pellucid gets hardened
2. the secondary oocyte completes meiosis II
3. the corpus luteum degenerates
4. menstruation does not occur

84 Read the following statements carefully and choose the option with only correct statements.
(a) Spermatogonia produce sperm cells by spermatogenesis that begins at puberty.
(b) All spermatogonia periodically undergo meiosis.
(c) A primary spermatocyte completes first meiotic division during embryonic development.
(d) The secondary spermatocytes have only 23 chromosomes each.
1. (a) and (b)
2. (b) and (c)
3. (c) and (d)
4. (a) and (d)

85 Read the following statements :
Statements A: Statutory decreasing of marriageable age of the males to 18 years can help to check population growth rate
Statement B: An alarming decline in population growth rate could lead to an absolute scarcity of basic requirements, i.e., food, shelter, etc
Choose the option which describes the above statements correctly :
1. Only A is correct
2. Only B is correct
3. Both A and B are incorrect
4. Both A and B are correct

ZOOLOGY - SECTION B

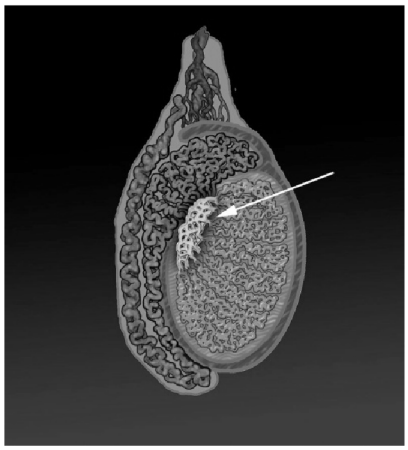
86 How many statements given below are correct?
(i) Relaxin is secreted by the ovary in the later phase of pregnancy.
(ii) Inner cell mass differentiates into ectoderm and endoderm just before implantation.
(iii) Implantation leads to pregnancy.
(iv) Embryo with 8 to 16 blastomeres is called morula.
1. 2
2. 1
3. 4
4. 3

87 Lactational amenorrhea method of contraception is based on the fact that:
1. Ovulation and menstrual flow does not occur post conception during intense lactation
2. The cervix mucus becomes hostile to sperms after parturition during intense lactation
3. Ovulation and menstrual flow does not occur post partum during intense lactation
4. The endometrium is reabsorbed rather than sloughed off during intense lactation

88 Copper releasing IUDs:
I. are not effective as emergency contraceptives
II. damage sperms and disrupt their motility
1. Both I and II are correct
2. Only I is correct
3. Only II is correct
4. Both I and II are incorrect

89 Regarding the male accessory sex ducts:
1. About 200 seminiferous tubules are present in testis lobule
2. Epididymis is located along the anterior surface of each testis
3. Vas deferens ascends to the abdomen and loops over the bladder
4. Ducts of seminal vesicles open at the urethral meatus

90 The arrow in the figure shows:



1. Rete testis
2. Caput epididymis
3. Cauda epididymis
4. Vasa efferentia

91 Read the following statements (a) to (d) w.r.t. normal adult human and choose the option with only correct statements.
a. Interstitial spaces of testis contain Leydig cells and other immunologically competent cells.
b. Testes are situated inside the abdominal cavity within a pouch called scrotum.
c. The scrotum helps in maintaining the low temperature necessary for spermatogenesis.
d. Each lobule of testis contains 250 seminiferous tubules in which sperms are produced.
1. (a) and (b)
2. (b) and (c)
3. (a) and (c)
4. (c) and (d)

92 Identify the incorrect statement regarding female reproductive system?
1. The first meiotic division of a primary oocyte forms two secondary oocytes that remain in this stage unless fertilization occurs.
2. Uterine tube, fallopian tube, and oviduct are terms used to refer to the same organ.
3. Menopause marks the termination of both menstruation and ovulation.
4. An ectopic pregnancy is an implantation of the blastocyst in a site other than the uterus.

93 Consider the two statements
I. Sertoli cells divide meiotically to produce sperms
II. Leydic cells secrete androgens when stimulated by FSH
1. Only I is correct
2. Only II is correct
3. Both I and II are correct
4. Both I and II are incorrect

94 Choose the incorrect statement :
1. Mammary glands are an exclusive feature of mammals
2. Snakes and lizards shed their scales as skin cast
3. Forelimbs in birds are modified for swimming
4. All birds are homoiothermous

95 What is the secretory phase in the human menstrual cycle also called? How long does it last?
1. Luteal phase, four days
2. Follicular phase, four days
3. Follicular phase, fourteen days
4. Luteal phase, fourteen days

96 Which of the following is not a cause for the rapid increase of Indian population today?
1. A rapid decline in death rate
2. An increase in the number of people in reproducible age
3. An increase in the birth rate
4. A decrease in infant mortality and maternal mortality rates

97 Consider the two statements:
I. During pregnancy, there is no menstruation.
II. Corpus luteum degenerates early in the event of fertilization
1. Both I and II are correct and II explains I
2. Both I and II are correct but II does not explain I
3. I is correct but II is incorrect
4. I is incorrect but II is correct

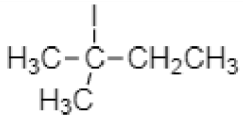
98 In animals exhibiting internal fertilization:
1. There is high synchrony between the two sexes
2. The chances of desiccation of the embryo is high
3. The male gamete is motile
4. Vulnerability to predators is increased

99 The first meiotic division in the primary oocyte:
1. occurs after the onset of puberty
2. is completed before the birth
3. begins in foetal life
4. occurs at the time of fertilization

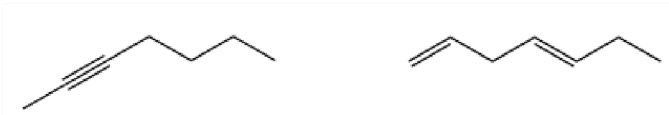
100 The last of the germ layers to appear in the human embryonic development is the:
1. Ectoderm
2. Endoderm
3. Mesoderm
4. All the three germ layers appear simultaneously

CHEMISTRY - SECTION A

101 Which of the following compounds undergo E_2 reactions more easily?

1.	$(CH_3)_2C(Br)\cdot CH_2CH_3$
2.	$CH_3(CH_2)_2CH_2Cl$
3.	$CH_3(CH_2)_2CH_2I$
4.	

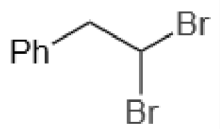
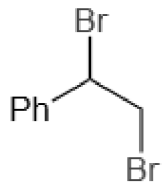
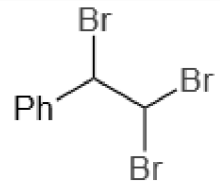
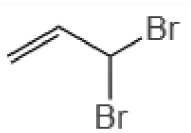
102 The following compounds are :



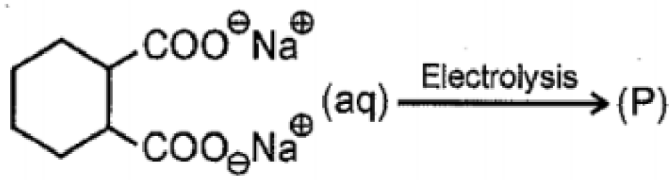
1. geometrical isomers
2. positional isomers
3. optical isomers
4. functional group isomers

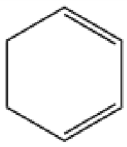
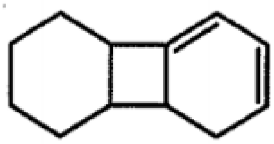
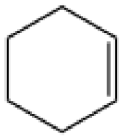
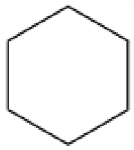
103 Geometrical isomerism is not shown by :
1. 1,1-Dichloro-1-pentene
2. 1,2-Dichloro-1-pentene
3. 1,3-Dichloro-2-pentene
4. 1,4-Dichloro-2-pentene

104 The product of the following reaction is:

1.		2.	
3.		4.	

105 The major product (P), in the reaction given below, is:

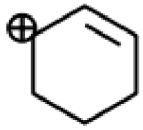
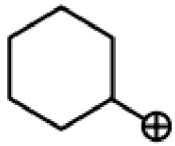
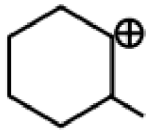
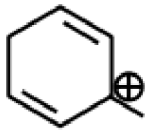


1.		2.	
3.		4.	

106 The incorrect method for the synthesis of alkenes is:
1. treatment of alkynes with Na in liquid NH_3
2. heating alkyl halides with alcoholic KOH
3. treating alkyl halides in aqueous KOH solution
4. treating vicinal dihalides with Zn metal

107 The incorrect statement among the following is-
1. Freon 12 (CCl_2F_2) is manufactured from tetrachloromethane by Swarts reaction.
2. Chloroform is slowly oxidised by water in the presence of light to an extremely poisonous gas, carbonyl chloride.
3. The antiseptic properties of CHI_3 are due to the liberation of free iodine and not due to iodoform itself.
4. Methanol, CH_3OH, also known as 'wood spirit', was produced by destructive distillation of wood

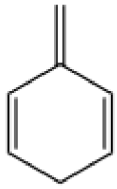
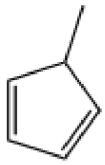
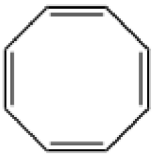
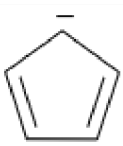
108 Which of the following is the most stable carbocation?

1.		2.	
3.		4.	

109 The dipole moment of some alkyl halides is correctly given as
1. $CH_3F > CH_3Cl > CH_3Br > CH_3I$
2. $CH_3F < CH_3Cl < CH_3Br < CH_3I$
3. $CH_3Cl > CH_3F > CH_3Br > CH_3I$
4. $CH_3Cl > CH_3Br > CH_3F > CH_3I$

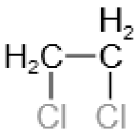
110 Statement-I: 2-Methylbutane and 2,2-Dimethylpropane are chain isomers.
Statement-II: Metamerism arises due to different alkyl chains on either side of the polyvalent functional group in a molecule.
In the light of the above statements, choose the correct answer :
1. Statement I is correct but statement II is incorrect
2. Statement I is incorrect but statement II is correct
3. Both statement I and statement II are correct
4. Both statement I and statement II are incorrect

111 Which of the following compounds is aromatic?

1.		2.	
3.		4.	

112 With respect to the conformers of ethane, which of the following statements is true?
1. Bond angle changes but bond length remains the same
2. Both bond angle and bond length change
3. Both bond angle and bond length remain the same
4. Bond angle remains the same but bond length changes

113 Match the organic compound given in Column I with their names in Column II. Select the correct option.

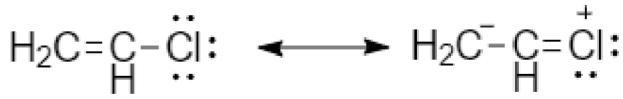
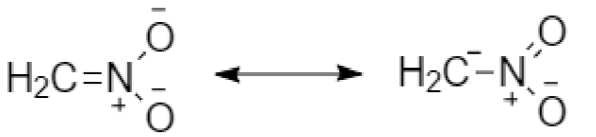
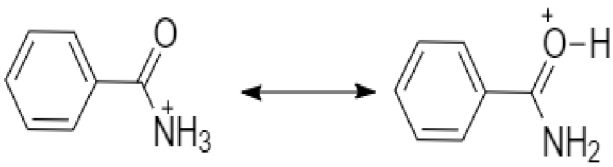
Column I	Column II	
(a) CH_2Cl_2	(i)	neo-Pentyl chloride
(b) $(CH_3)_3CCH_2Cl$	(ii)	Ethylidene chloride
(c) CH_3CHCl_2	(iii)	Ethylene dichloride
(d) 	(iv)	Methylene chloride

1. a=ii; b=iii; c=i; d=iv
2. a=iv; b=i; c=ii; d=iii
3. a=iv; b=iii; c=i; d=ii
4. a=ii; b=iv; c=i; d=iii

114 Among (a)-column chromatography; (b)-paper chromatography and (c)-thin layer chromatography, an example of partition chromatography is:
1. a and b only
2. b and c only
3. b only
4. c only

115 Among the following, the molecule that undergoes nucleophilic substitution exclusively by S_N1 mechanism is:
1. Methyl chloride
2. Cyclohexyl chloride
3. Isopropyl chloride
4. Benzyl chloride

116 Which of the following pairs does not represent resonance structures?

1.	
2.	
3.	
4.	

117 For the following molecules/intermediates/species:
A - BH_3; B - SiH_4; C - PCl_3; D - $:CH_2$; E - NH_3
Which of the above are electrophiles?
1. A, B, C and D only.
2. A, B and C only.
3. A only.
4. A and D only.

118 A molecule that has 1°, 2° and 3° carbon atoms is:
1. 2,3,4-trimethylpentane
2. chlorocyclohexane
3. 1,1-dimethyl cyclohexane
4. methylcyclohexane

119 The organic compound which can be purified by steam distillation is:
1. acetone
2. aniline
3. glucose
4. ethanol

120 Which of the following statement is correct?
1. Alkyne is more reactive towards electrophilic addition than alkene
2. Addition of HBr to an unsymmetrical alkene takes place according to anti-Markownikoff's rule
3. $CH_3\overset{+}{C}HCH_3$ is more stable than $CH_3CH_2\overset{+}{C}HCH_3$
4. All of the above

121 $CH_3CH_2Cl \xrightarrow[Acetone]{NaI} CH_3CH_2I$. This reaction is
1. Swarts reaction
2. Finkelstein reaction
3. Gattermann reaction
4. Sandmeyer's reaction

122 Statement-I: In the Lassaigne test, an organic compound with both N and S, responds to the test of SCN^-.
Statement-II: In the Lassaigne test, if Na is taken in excess, it destroys SCN^- and forms Na_2S and NaCN.
1. Statement-I is correct only.
2. Statement-II is correct only.
3. Both statement-I & II are correct.
4. None of the statement is correct.

123 For the heterolytic cleavage of the given reaction:
$CH_3CH_2Cu \rightarrow$ A and B
'A' and 'B', respectively, are :
1. $^{-}CH_2CH_3$ *and* ^{-}Cu
2. $^{+}CH_2CH_3$ *and* ^{-}Cu
3. $^{-}CH_2CH_3$ *and* ^{+}Cu
4. ^{+}Cu *and* ^{-}Cu

124 Compounds A, B, C, D, E, and F are the following :

A.	$CH_2 = CH - CHO$
B.	$(CH_3)_2C = C(CH_3)_2$
C.	$CH_3CH = CH - CH_3$
D.	$CH_3C \equiv C - CH_2 - CH_3$
E.	$CH_3 - CH = CH_2$
F.	$CH_3 - C \equiv C - CH_3$,

Which of the above compounds, upon ozonolysis, can give aldehyde(s)?
1. A, B, D and F
2. A, C and E
3. B, D and E
4. A only

125 0.102 g of an organic compound X was oxidized with fuming nitric acid. The resulting solution, after reaction with an excess of aqueous $BaCl_2$, produced 0.233 g of $BaSO_4$ as a precipitate. The percentage of sulphur in the compound is :
[Given: Atomic wt. of Ba = 137]
1. 31.4 %
2. 37.2 %
3. 42.1 %
4. 26.4 %

126 Ammonium molybdate is the reagent used to detect:
1. Nitrogen as nitrate
2. Phosphorous as phosphate
3. Sulphur as sulfate
4. Iodine as iodate

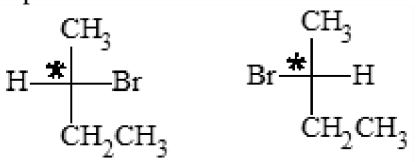
127 Consider the following reactions

(i)	$CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3} A$(major)
(ii)	$(CH_3)_3CH \xrightarrow{KMnO_4} B$(major)

Major products (A) and (B) respectively are
1. Methanol and acetone
2. Methanal and Acetaldehyde
3. Methanal and 2-Methylpropan-2-ol
4. Methanol and 2-methylpropan-2-ol

128 Iodination of a hydrocarbon (C-H→C-I) with molecular iodine is a slow and reversible reaction. However, it can be carried out in the presence of an oxidizing agent such as
1. H_3BO_3
2. HIO_3
3. H_3PO_4
4. CH_3CO_2H

129 Assertion: The addition of HBr to 1-butene gives two optical isomers.
Reason: The product contains one chiral carbon atom.



1. Both Assertion & Reason are true and the reason is the correct explanation of the assertion.
2. Both Assertion & Reason are true but the reason is not the correct explanation of the assertion.
3. Assertion is a true statement but Reason is false.
4. Both Assertion and Reason are false statements.

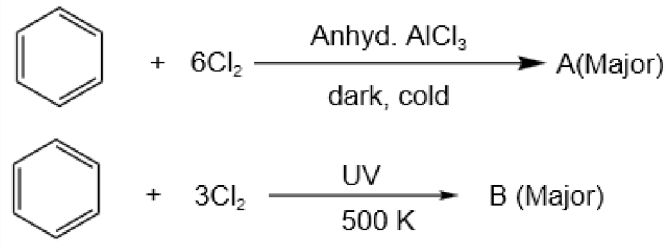
130 Which among the following is meta directing group towards aromatic electrophilic substitution reaction?
1. $-NHCOCH_3$
2. $-CH_3$
3. $-Cl$
4. $-COR$

131 IUPAC name of the given compound is

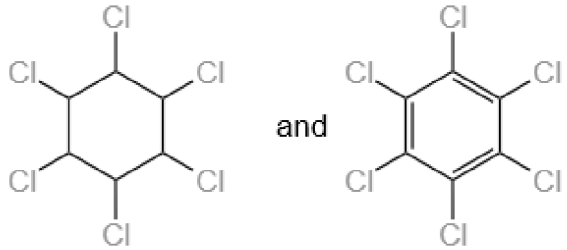
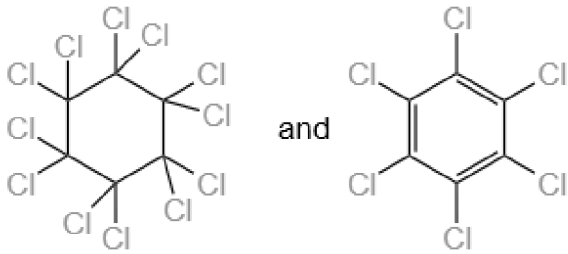
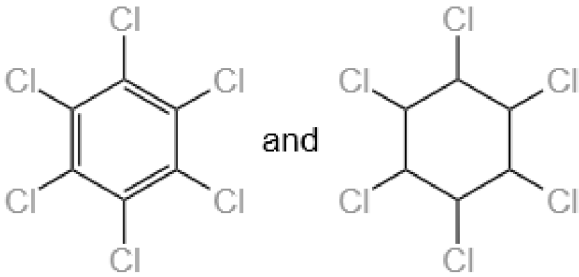
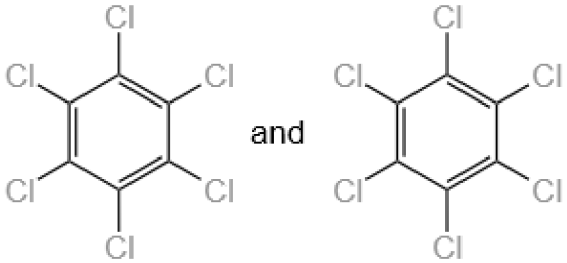
1. 1-Ethyl-4,4-dimethylcyclopentane
2. 3-Ethyl-1,1-dimethylcyclopentane
3. 1-Ethyl-3,3-dimethylcyclopentane
4. 4-Ethyl-1,1-dimethylcyclopentane

132 Statement I: Inductive effect and resonance are permanent effect
Statement II: The energy of actual structure of the molecule (the resonance hybrid) is higher than that of any of the canonical structures.
In light of the above statements, choose the correct option :
1. Statement I is correct but statement II is incorrect
2. Both statement I and statement II are correct
3. Both statement I and statement II are incorrect
4. Statement I is incorrect but statement II is correct

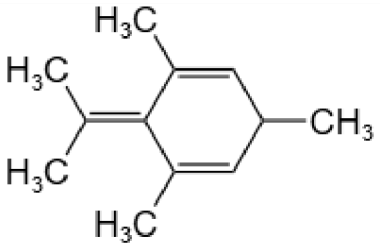
133 Consider the following reactions



Major products A and B respectively are-

1.	
2.	
3.	
4.	

134 How many hydrogens are involved in hyperconjugation in the given organic compound A?

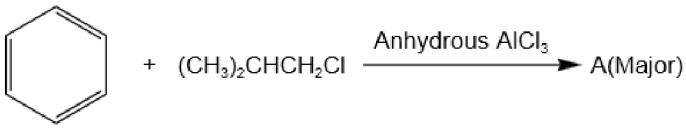
A - 

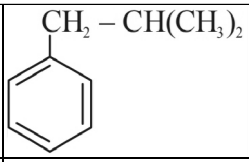
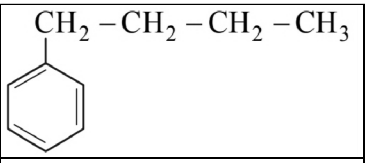
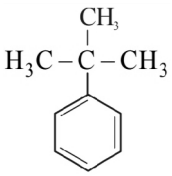
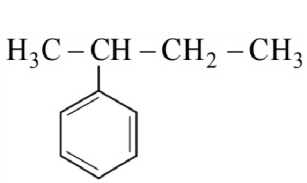
1. 12
2. 13
3. 15
4. 16

135 Which of the following compounds reacts with a dilute, aqueous solution of potassium permanganate to give a corresponding alcohol?
1. Propane
2. 2-Methylpropane
3. Ethane
4. Cyclohexene

CHEMISTRY - SECTION B

136 The compound 'A' is:



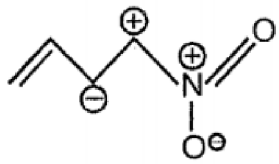
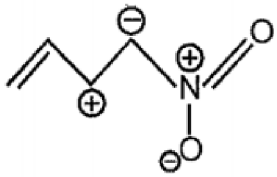
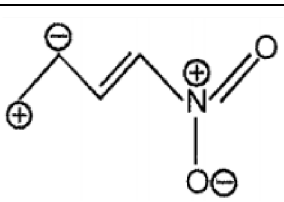
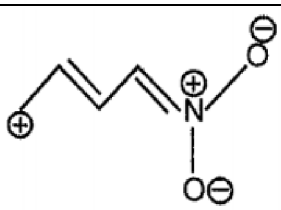
1.		2.	
3.		4.	

137 Select the correct option based on statements below:

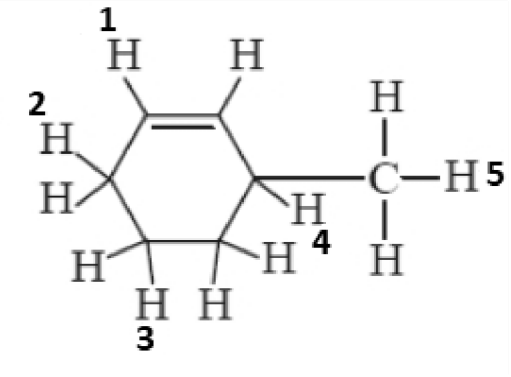
Assertion (A):	Chlorine is an electron withdrawing group but it is ortho, para directing in electrophilic aromatic substitution.
Reason (R):	Inductive effect of chlorine destabilises the intermediate carbocation formed during the electrophilic substitution, however due to the more pronounced resonance effect, the halogen stabilises the carbocation at ortho and para positions.

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

138 Among the following, the least stable resonance structure is:

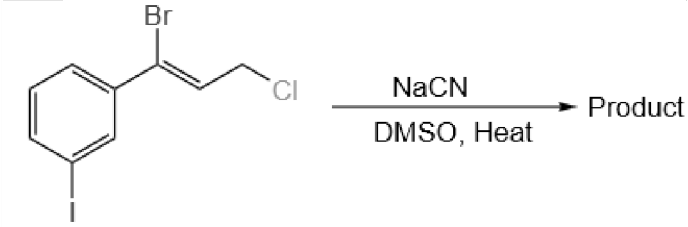
1.		2.	
3.		4.	

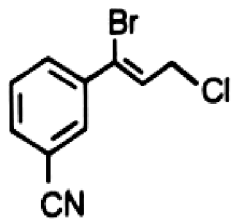
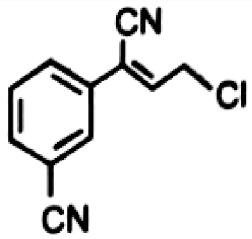
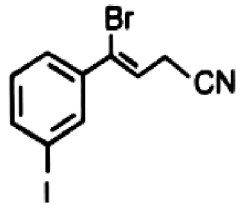
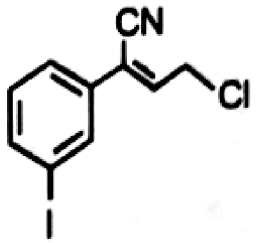
139



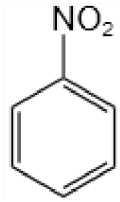
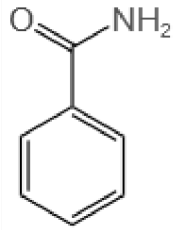
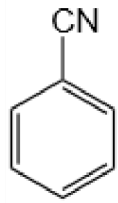
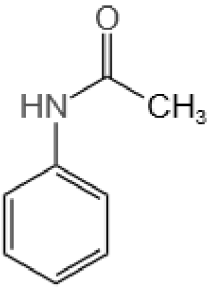
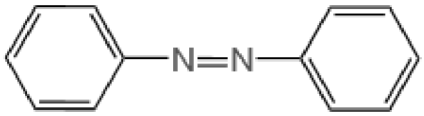
The correct order of abstraction of hydrogen towards homolytic fission is
1. 2>4>3>5>1
2. 4>2>5>3>1
3. 4>2>3>5>1
4. 4>3>2>5>1

140 The major product formed in the given reaction is-



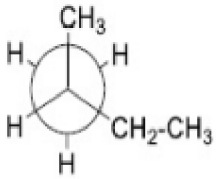
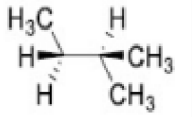
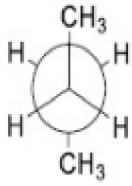
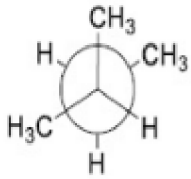
1.		2.	
3.		4.	

141 Consider the following compounds:

In how many compounds, Kjeldahl method is not applicable for estimation of nitrogen?
1. 5
2. 3
3. 2
4. 4

142 Among the following, the structure which does NOT represent 2-methyl butane is

1.		2.	
3.		4.	

143 Which of the following pairs of structural formulae represent(s) structural isomers?

(A) CH_3CH_2OH and CH_3OCH_3

(B) $CH_3CH(CH_3)CH_2CH_2CH_3$ and $CH_3CH_2CH_2CH(CH_3)CH_3$

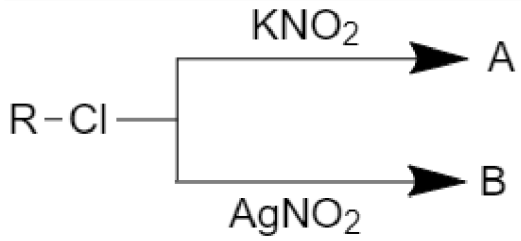
(C) $CH(OH)=CHCH_2OH$ and CH_3CH_2COOH

1. A only
2. A, B, and C
3. A and C only
4. B and C only

144 C – H bond length is minimum in

1. Ethene
2. Ethyne
3. Ethane
4. Methane

145 Consider the following reactions:



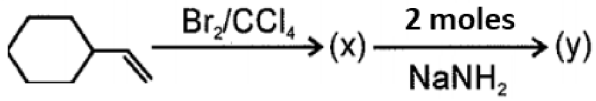
A and B are-

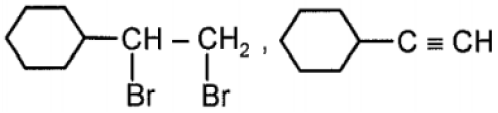
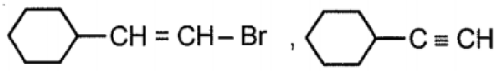
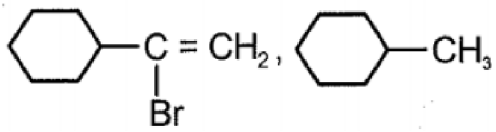
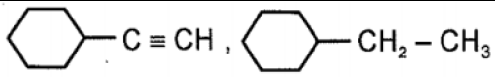
1. Tautomers
2. Functional isomers
3. Position isomers
4. Metamers

146 Select the correct statement:

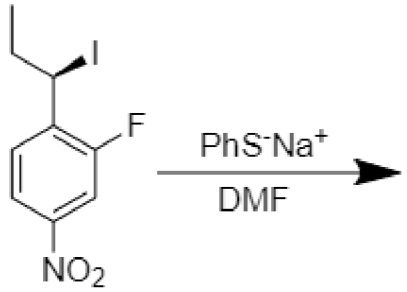
1. cis-But-2-ene has a higher boiling point than trans-But-2-ene.
2. cis-But-2-ene has lower boiling point than trans-But-2-ene.
3. cis-But-2-ene has a lower dipole point than trans-But-2-ene.
4. cis-But-2-ene is non-polar.

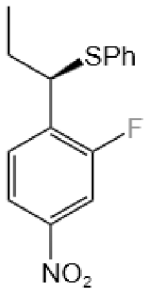
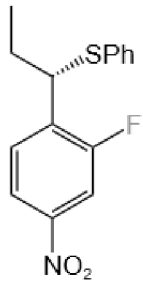
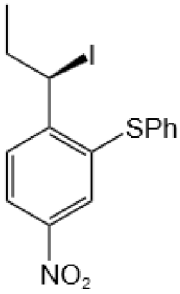
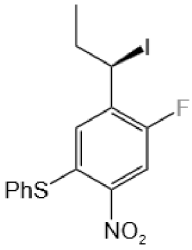
147



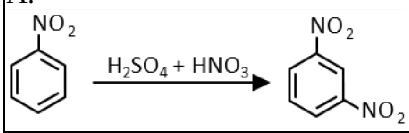
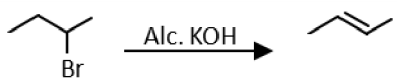
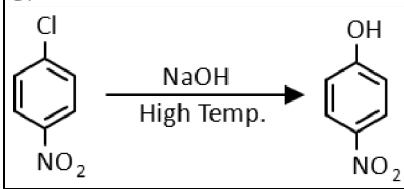
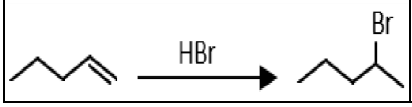
1.	
2.	
3.	
4.	

148 Major Product of the given reaction is-



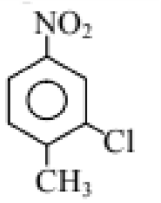
1.		2.	
3.		4.	

149 Match List I with List II:

List I Reaction	List II Type of reaction
A. 	I. Nucleophilic substitution
B. 	II. Saytzeff elimination
C. 	III. Electrophilic addition
D. 	IV. Electrophilic substitution

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

150 The correct IUPAC name of the following compound is :



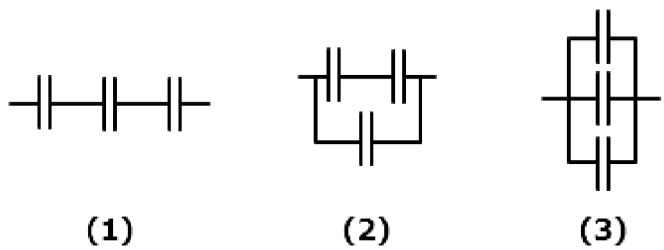
1. 5-chloro-4-methyl-1-nitrobenzene
2. 2-chloro-1-methyl-4-nitrobenzene
3. 2-methyl-5-nitro-1-chlorobenzene
4. 3-chloro-4-methyl-1- nitrobenzene

PHYSICS - SECTION A

151 A parallel plate capacitor is given equal and opposite charges. The electrostatic force per unit area between the plates:

1.	depends on the square of surface charge density.
2.	depends on the separation between the plates.
3.	depends directly on the plate area of each plate.
4.	depends directly on the dielectric constant of the medium.

152 Three identical capacitors are connected as follows:



Which of the following shows the order of increasing capacitance (smallest first)?

1.	(3), (2), (1)
2.	(1), (2), (3)
3.	(2), (1), (3)
4.	(2), (3), (1)

153 If the charge on a capacitor is increased by 2 C, the energy stored in it increases by 44%. The original charge on the capacitor is (in Coulomb):
1. 10
2. 20
3. 30
4. 40

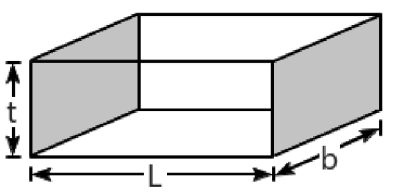
154 When current i is flowing through a conductor, the drift velocity of free electrons is v. If $2i$ current is flows through the same metal but with double the area of cross-section, then the drift velocity of free electrons will be:
1. $\frac{v}{4}$
2. $\frac{v}{2}$
3. v
4. $4v$

155 Electric potential at any point (x, y, z) m in space is given by $V = 3x^2$ V. The electric field at the point $(1, 0, 3)$ m will be:

1.	3 Vm^{-1}, directed along the positive x-axis
2.	3 Vm^{-1}, directed along the negative x-axis
3.	6 Vm^{-1}, directed along the positive x-axis
4.	6 Vm^{-1}, directed along the negative x-axis

156 Two parallel plate capacitors of capacity C and $3C$ are connected in parallel combination and charged to a potential difference of 18 V. The battery is then disconnected and the space between the plates of the capacitor of capacity C is completely filled with a material of dielectric constant 9. The final potential difference across the combination of capacitors will be:
1. 3 V
2. 5 V
3. 9 V
4. 6 V

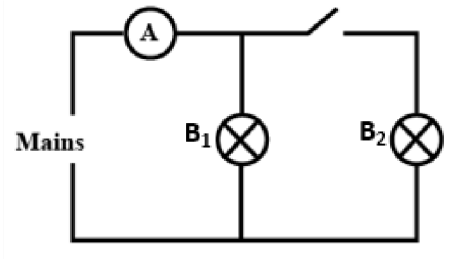
157 Consider a thin rectangular sheet of side L, width b and thickness t, made of a material of resistivity ρ. The resistance between two opposite faces, shown by the shaded areas in the figure is:



1. directly proportional to b
2. inversely proportional to t
3. inversely proportional to L
4. both (1) and (2)

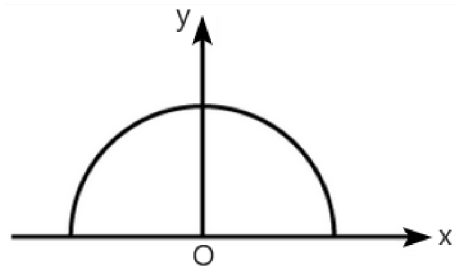
158 Two metallic wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of these wires respectively, the effective conductivity of the combination is:
1. $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$
2. $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$
3. $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$
4. $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

159 How will the reading in the ammeter A, as shown in the figure, be affected if another identical bulb B_2 is connected in parallel to bulb B_1 as shown?
(The voltage in the mains is maintained at a constant value)



1. the reading will reduce to one-half.
2. the reading will not be affected.
3. the reading will increase two-fold.
4. the reading will increase four-fold.

160 A thin semi-circular ring of radius r has a positive charge q distributed uniformly over it. The net potential at the center 'O' is:

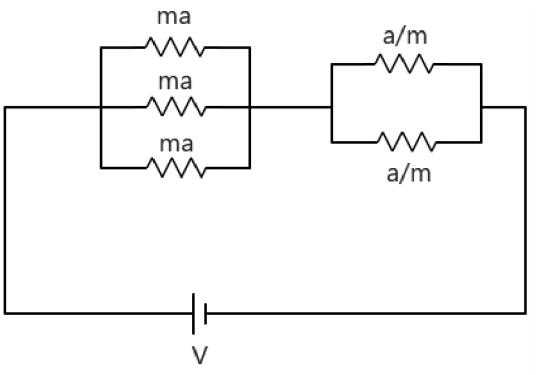


1. $-\frac{q}{2\pi\varepsilon_0 r}$
2. $-\frac{q}{4\pi\varepsilon_0 r}$
3. $\frac{q}{4\pi\varepsilon_0 r}$
4. 0

161 An electron enters the space between the plates of a parallel plate capacitor at an angle of 30° with the plates and leaves at an angle of 45° to the plates. The component of velocity parallel to the plates:

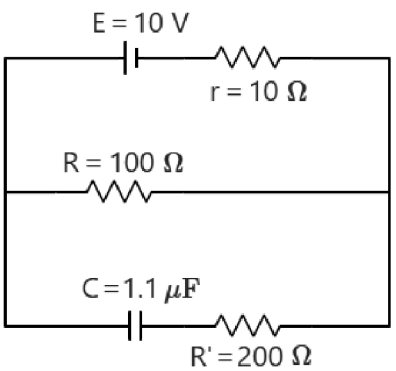
1.	remains unchanged
2.	varies with constant acceleration
3.	varies with variable acceleration
4.	varies periodically

162 In the given circuit, a is an arbitrary constant. The value of m for which the equivalent circuit resistance is minimum will be $\sqrt{\frac{x}{2}}$. The value of x is:



1. 6
2. 9
3. 3
4. 12

163 As shown in the figure, in a steady state, the charge stored in the capacitor is $x \times 10^{-6}$ C. The value of x is:



1. 20
2. 10
3. 30
4. 40

164 Two electric dipoles of dipole moments 1.2×10^{-30} C-m and 2.4×10^{-30} C-m are placed in two different uniform electric fields of strengths 5×10^4 NC^{-1} and 15×10^4 NC^{-1} respectively. The ratio of maximum torque experienced by the electric dipoles is $\frac{1}{x}$. The value of x is:

1. 2
2. 4
3. 6
4. 8

165 Energy per unit volume for a capacitor having area A and separation d kept at potential difference V is given by:

1. $\frac{1}{2}\varepsilon_o \frac{V^2}{d^2}$
2. $\frac{1}{2\varepsilon_o} \frac{V^2}{d^2}$
3. $\frac{1}{2}CV^2$
4. $\frac{Q^2}{2C}$

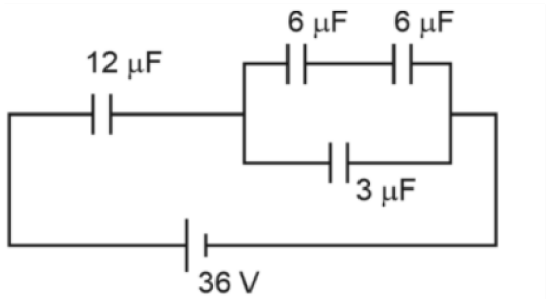
166 A 600 pF capacitor is charged by 10 V battery. It is then disconnected from the supply and connected to another uncharged 600 pF capacitor. The energy lost in the process will be:

1. 3×10^{-9} J
2. 1.5×10^{-9} J
3. 3×10^{-8} J
4. 1.5×10^{-8} J

167 Two hundred cells of the same emf E and same internal resistance r are connected in series in the same order without external resistance. The potential drop across 50 cells is found to be:

1. $50E$
2. $150E$
3. $200E$
4. zero

168 In the given circuit, charge on the 12 μF capacitor will be:



1. 144 μC
2. 72 μC
3. 36 μC
4. 28 μC

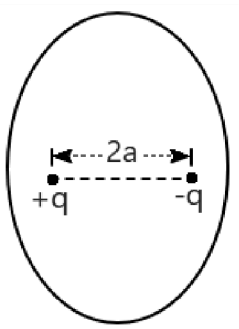
169 A Van de Graaff generator is used for:

1.	accelerating neutron
2.	charging capacitor
3.	generating electricity
4.	accelerating charged particles

170 A system has two charges $q_1 = 4.5 \times 10^{-6}$ C and $q_2 = -4.5 \times 10^{-6}$ C located at points $A: (0, 0, -20)$ cm and $B: (0, 0, +20)$ cm, respectively. The electric dipole moment of the system is:
1. 9×10^{-6} C-m
2. 1.8×10^{-7} C-m
3. 1.8×10^{-6} C-m
4. 9×10^{-7} C-m

171 A parallel plate capacitor has surface charge densities $\pm\sigma$ on its plates. The amount of work required to increase the plate separation by dx is:
1. $\frac{\sigma^2}{\epsilon_0} Adx$
2. $\frac{\sigma^2}{2\epsilon_0} Adx$
3. $\frac{2\sigma^2}{\epsilon_0} Adx$
4. $\frac{\sigma^2 \epsilon_0}{2} Adx$

172 An electric dipole is enclosed by a Gaussian surface (see figure). The total electric flux through the surface is:



1. q/ε_0
2. zero
3. $-q/\varepsilon_0$
4. $2q/\varepsilon_0$

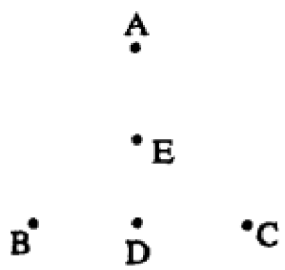
173 The tangent at any point of an equipotential surface makes an angle θ with the electric intensity vector at that point such that:
1. $\theta = 0^\circ$
2. $\theta = 90^\circ$
3. $\theta = 120^\circ$
4. $\theta = 180^\circ$

174 A battery gives a current of 0.5 A when connected across an external resistor of resistance 12 Ω and a current of 0.25 A when connected across an external resistor of resistance 30 Ω. What will be the emf of the battery?
1. 4.5 V
2. 9.0 V
3. 13.5 V
4. 18.0 V

175 Two capacitors, each having a capacitance of 40 μF are connected in series. The space between one of the capacitors is filled with a dielectric material of dielectric constant K such that the equivalent capacitance of the system becomes 24 μF. The value of K will be:
1. 1.5
2. 2.5
3. 1.2
4. 3

176 If an electric dipole of moment p is placed normal to the lines of force of electric intensity E, then the work done in deflecting it through an angle of 180° will be:
1. pE
2. $pE/2$
3. $2pE$
4. zero

177 In the figure, points A, B, and C are the vertices of an equilateral triangle with sides of length 10^{-5} m. Point D is exactly between B and C, while point E is in the same plane as A, B, and C and equidistant from them. Positive charges of magnitude $Q = 1.1 \times 10^{-15}$ C are located at points A, B, and C.



What is the direction of the electric field at point D?

1.	It points up (↑).
2.	It points down (↓).
3.	It points into the page.
4.	It has zero magnitude.

178 A parallel plate capacitor is formed by two plates, each of area 30π cm^2 separated by 1 mm. A material of dielectric strength 3.6×10^7 Vm^{-1} is filled between the plates. If the maximum charge that can be stored on the capacitor without causing any dielectric breakdown is 7×10^{-6} C, the value of the dielectric constant of the material is:
$\left\{ \text{Use : } \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2} \right\}$
1. 1.66
2. 1.75
3. 2.25
4. 2.33

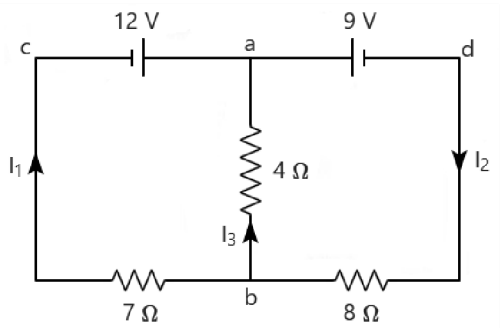
179 Two point charges, Q each, are placed at a distance d apart. A third point charge q is placed at a distance x from the mid-point on the perpendicular bisector. The value of x at which charge q will experience the maximum Coulomb's force is:
1. $x = d$
2. $x = \frac{d}{2}$
3. $x = \frac{d}{\sqrt{2}}$
4. $x = \frac{d}{2\sqrt{2}}$

180 An electric heater consists of a nichrome coil and runs under 220 V, consuming 1 kW of power. Part of its coil burned out and it was reconnected after cutting off the burnt portion. The power it will consume now is:

1.	more than 1 kW
2.	less than 1 kW but not zero
3.	1 kW
4.	0

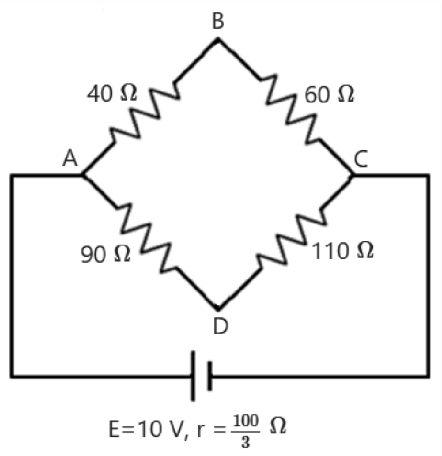
181 A slab of dielectric constant K has the same cross-sectional area as that of the plates of a parallel plate capacitor and thickness $\frac{3}{4}d$, where d is the separation of the plates. The capacitance of the capacitor, when the slab is inserted between the plates will be: (Given: $C_0 =$ capacitance of capacitor with air as medium between plates)
1. $\frac{4KC_0}{3+K}$
2. $\frac{3KC_0}{3+K}$
3. $\frac{3+K}{4KC_0}$
4. $\frac{K}{4+K}$

182 In the circuit shown in the figure, applying the loop rule to the loop abca gives,



1. $-12+7I_1-4I_3=0$
2. $12+7I_1-4I_3=0$
3. $-12-7I_1+4I_3=0$
4. $-12+7I_1+4I_3=0$

183 In a Wheatstone bridge shown in the following figure, the conventional current between points B and D is:

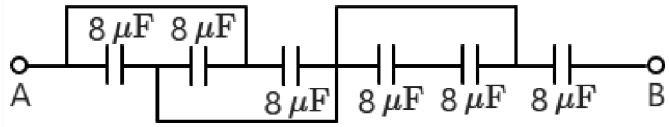


1. from B to D
2. from D to B
3. zero
4. indeterminate

184 On interchanging the resistances, the balance point of a meter bridge shifts to the left by 10 cm. The resistance of their series combination is 1 $k\Omega$. How much was the resistance on the left slot before interchanging the resistances?

1. 450 Ω
2. 550 Ω
3. 650 Ω
4. 350 Ω

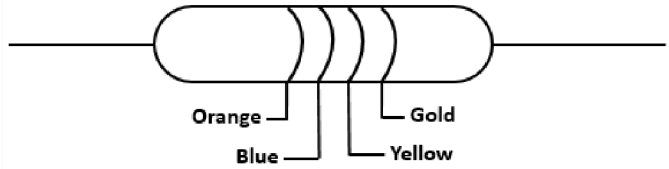
185 The equivalent capacitance between points A and B in the figure (shown below) in the figure will be:



1. 2 μF
2. 4 μF
3. 6 μF
4. 8 μF

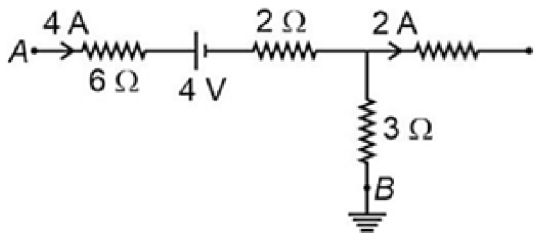
PHYSICS - SECTION B

186 The value of resistance for the colour code of the given resistor is:



1. $(36\pm36)\ k\Omega$
2. $(470\pm47)\ k\Omega$
3. $(360\pm36)\ k\Omega$
4. $(360\pm18)\ k\Omega$

187 What would be the potential difference between points A and B in a given part of the circuit?



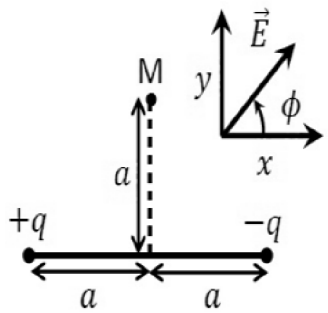
1. 28 V
2. 42 V
3. -32 V
4. 36 V

188 A dielectric slab is inserted between the plates of an isolated charged capacitor. Which of the following remains unchanged?

(I).	The charge on the plates
(II).	The potential difference between the plates
(III).	The energy stored in the capacitor

1.	I only
2.	I, II
3.	I, III
4.	I, II, III

189 Consider two charges, $+q$ and $-q$ $(q > 0)$ placed at a distance $2a$ from each other. At the point M (see figure below), the electric field makes an angle ϕ from the x-axis. The correct value of ϕ is:



1. 0°
2. 90°
3. 180°
4. 270°

190 Select the correct option based on the statements given below:

Statement I:	Electric potential is constant within and at the surface of each conductor.
Statement II:	Electric field just outside a charged conductor is perpendicular to the surface of the conductor at every point.

1.	Both statement I and statement II are correct.
2.	Both statement I and statement II are incorrect.
3.	Statement I is correct but statement II is incorrect.
4.	Statement I is incorrect but statement II is correct.

191 A silicon wafer of n type material of cross-sectional area 3.14×10^{-6} m^2 with conductivity of 5.8×10^7 siemens per meter and electron mobility of 0.0032 $m^2V^{-1}s^{-1}$ is subjected to an electric field of 20 mV/m. Now that you have all this data, try to match Column I with Column II (Neglect hole concentration)

	Column I		**Column II**
A.	The electron concentration in the wafer is	(P)	1.16×10^6 SI unit
B.	Current density in wafer is	(Q)	3.64 SI unit
C.	Current flowing through wafer is	(R)	6.4×10^{-5} SI unit
D.	The drift velocity of electrons is	(S)	1.13×10^{29} SI unit

1.	A(P), B(Q), C(R), D(S)
2.	A(P), B(S), C(R), D(Q)
3.	A(S), B(P), C(Q), D(R)
4.	A(Q), B(P), C(R), D(S)

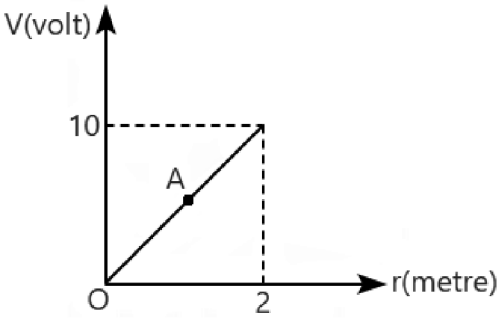
192 In an experiment, two bodies are rubbed against each other during which bodies get 1 C magnitude of charge. How many electrons from one body get transferred to the other body during rubbing?

1. 6.25×10^{20}
2. 1.6×10^{19}
3. 6.25×10^{18}
4. 1.6×10^{-19}

193 Two charged particles P and Q are 0.10 m apart. The charge on P is 1.50×10^{-7} C and the charge on Q is 1.50×10^{-7} C. Particle P experiences an electrostatic force of magnitude F because it is near to the charge on particle Q. The distance between the two particles is increased to 0.20 m. The charge on P increases to 4.50×10^{-7} C and the charge on Q increases to 6.00×10^{-7} C. What is the magnitude of the force that particle P experiences now?

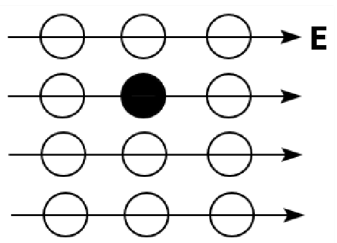
1. $\frac{F}{4}$
2. $12F$
3. $6F$
4. $3F$

194 Potential (V) versus distance (r) graph is shown in the diagram. The value of electric field at an instant A will be :



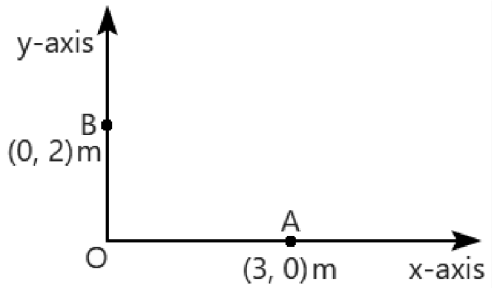
1. 5 V/m
2. -10 V/m
3. -5 V/m
4. 10 V/m

195 There is a uniform electric field of intensity E which is shown in the figure. How many labelled points have the same electric potential as the fully shaded point?



1. 2
2. 3
3. 8
4. 11

196 A charge $Q = 2\ \mu$C is situated at origin of co-ordinate axis. Another charge $5\ \mu$C on x-axis at point $A(3, 0)$, is brought to point $B(0, 2)$ on y-axis. The work done by an external agent is:



1. 12 mJ
2. 15 mJ
3. 20 mJ
4. 34 mJ

197 Suppose there is a uniform electron field $\vec{E} = (50\ \text{V/m})\hat{j}$. If a negatively charged particle moves in the $(-y)-$direction, then its electric potential energy:
1. increases
2. decreases
3. remains constant
4. first increases then decreases

198 Select the correct option based on the statements below:

Statement I:	Electrostatic field lines do not form any closed loops.
Statement II:	Gauss's law is very useful in calculation of the electrostatic field when the system doesn't have any symmetry.

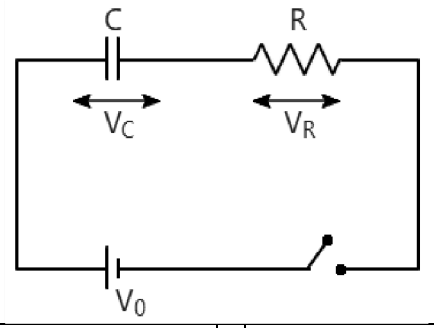
1.	Statement I is correct while Statement II is incorrect.
2.	Statement II is correct while Statement I is incorrect.
3.	Both Statement I and II are correct.
4.	Both Statement I and II are incorrect.

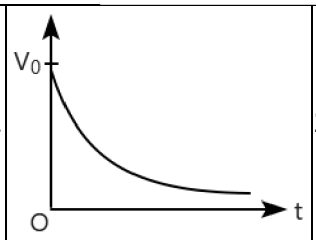
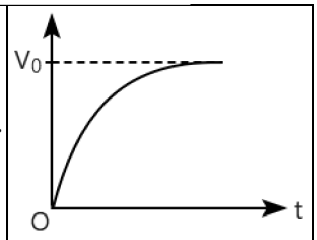
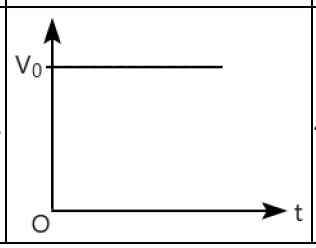
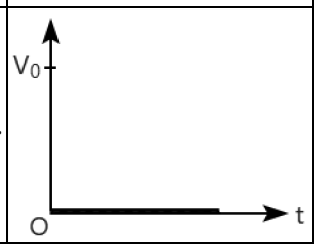
199 Given below are two statements:

Assertion (A):	If electrons in an atom were stationary, then they would fall into the nucleus.
Reason (R):	Electrostatic force of attraction acts between negatively charged electrons and positive nucleus.

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

200 A capacitor C is charged with the help of a resistance R as shown in the figure, Variation of $(V_R + V_C)$ with time t is correctly shown in which of the options?
(V_R and V_C are instantaneous potential drops across R and C respectively).



1.		2.	
3.		4.	

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.