BOTANY - SECTION A

1 Consider the following two statements:

I:	A biodiversity hotspot is a region with a high level of endemic species.
II:	Most hotspots are located in the tropics and most of them are forests.

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

2 Which of the following is correct match w.r.t biodiversity-rich region?

1.	National parks	–	95
2.	Wildlife sanctuaries	–	448
3.	Biosphere reserves	–	24
4.	Zoological parks	–	25

3 Given below are two statements:

Assertion (A):	Mitochondria and chloroplasts have their own DNA.
Reason (R):	Endoplasmic reticulum and Golgi body are the cell organelles which have their own DNA.

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.	Both **(A)** and **(R)** are False.

4 Identify the process that does not take place during the light reaction of photosynthesis:

1. chemiosmosis
2. oxygen liberation
3. electron transport
4. all of the above occur in a light reaction

5 Colonisation of tropical Pacific Islands by humans have resulted in extinction of more than _____ 3 pecies of native birds.

1. 2000
2. 7000
3. 784
4. 15000

6 Water hyacinth led to the decline of indigenous species when introduced in India. It grew massively because

1.	It turned invasive and killed its predator
2.	Indigenous species created the favourable environment for it
3.	It requires O_2 for photosynthesis which was provided by aquatic indigenous plants
4.	Its natural predator was not present

7 Identify the incorrect statement

1.	Tap root develops from the radicle of the seed
2.	The main function of the tap root system is food storage
3.	The tap root system is usually found in monocots
4.	The root that develops from the radicle is called as primary root

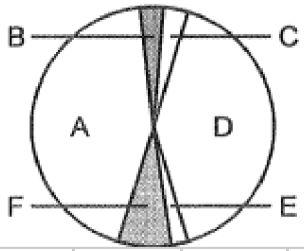
8 Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates, and proteins?

1. Glucose-6-phosphate
2. Fructose1, 6-bisphosphate
3. Pyruvic acid
4. Acetyl CoA

9 Identify the correctly matched pair:

1. Dodo: Mauritius
2. Quagga: Australia
3. Thylacine: Russia
4. Stellar's sea cow: Africa

10 Study the following pie chart w.r.t. global diversity of plants and select the correct option.

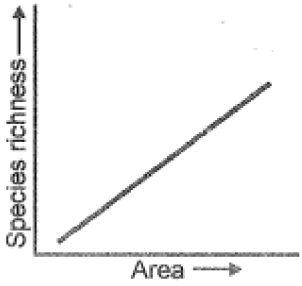


	A	B	C	D	E	F
1.	Anagios - perms	Lichens	Algae	Fungi	Mosses	Ferns and allies
2.	Fungi	Lichens	Algae	Angios-perms	Mosse	Ferns and allies
3.	Fungi	Mosses	Ferns and allies	Angios - perms	Lichens	Algae
4.	Angios - perms	Ferns and allies	Lichens	Fungi	Algae	Mosses

11 What was the cause of extinction of cichlid fish in lake Victoria in USA?
1. habitat loss and fragmentation
2. over-exploitation
3. alien species invasions
4. co-extinctions

12 If we analyse the species-area relationships among very large areas like the entire continents, then slope of line becomes much steeper in the range of
1. 0.1 to 0.6
2. 0.1 to 0.2
3. 0.6 to 1.2
4. 0.2 to 0.6

13 Relationship between species richness (S) and area (A) represented in the following graph is described by the equation



1. log S = log A + Z log C
2. log S = log C + Z log A
3. log C = log A + S log A
4. log C = log S + Z log A

14

Assertion (A):	Tilman found that plots with more species showed less year-to-year variation in total biomass
Reason (R):	He showed in his experiment that increased diversity contributed to higher productivity.

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

BOTANY - SECTION B

15 Loss of biodiversity may lead to all except
1. decline in plant production
2. increased resistance to environmental perturbance
3. increased variability in water use
4. increased variability in pest and disease cycle

16 Loss of biodiversity in a region may lead to
a. Increased variability in certain ecosystem processes.
b. Lowered resistance to environmental perturbations.
c. Decline in productivity.
1. Only a is correct
2. Only a is incorrect
3. Only b and c
4. Both a and b are incorrect

17 The search for previously unknown compounds in organisms that have never been used in traditional medicine is known as:
1. Biopiracy
2. Bioprospecting
3. Molecular pharming
4 Bioremediation

18 The main difference between "Sixth Extinction" and the previous five extinctions is that the sixth extinction:
1. is mainly occurring on islands
2. is mainly affecting plants
3. is occurring at a faster rate
4. does not involve human activities

19 Consider the following four statements (A-D) and select the correct option stating which ones are true (T) and which ones are false (F).
Statements:

(A)	Vertical distribution of different species occupying different levels in a community is called stratification.
(B)	Net primary productivity minus respiration losses is the gross primary productivity.
(C)	Rate of biomass production is called decomposition
(D)	Annual net primary productivity of oceans is 55 billion tons

	(A)	(B)	(C)	(D)
1.	F	T	F	T
2.	T	F	T	F
3.	T	F	F	T
4.	F	T	F	F

20 Select the incorrect statement.

1.	Species diversity decreases as we move away from the equator towards the poles.
2.	The IUCN red list (2004) documents the extinction of 784 species in the last 500 years.
3.	Amazon rainforest is so huge that it is called the 'heart of the planet.'
4.	Extinction of Steller's sea cow and passenger pigeon were due to their overexploitation by humans.

ZOOLOGY - SECTION A

21 Match the following and select the correct option

	Column I		Column II
a.	Heart attack	(i)	Blood is not pumped effectively to meet the needs of the body
b.	Heart failure	(ii)	Heart stopes beating completly
c.	Cardiac arrest	(iii)	Heart muscles are suddenly damaged due to inadequate blood supply

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

22 Given below are two statements:

Assertion (A):	Vasa recta and Henle's loop play a significant role in maintaining high osmolarity of medullary interstitial fluid
Reason (R):	Osmolarity increases from 300 $mOsmolL^{-1}$ to 1200 $mOsmolL^{-1}$ as we move from cortex to medullary region

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.	Both **(A)** and **(R)** are False.

23

Assertion (A):	Multiload-375 is an IUD which helps in contraception.
Reason (R):	It releases synthetic hormone which suppresses sperm motility and its fertilising capacity.

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

24 What could be the most probable reason for setting up GEAC by Indian Government?

1.	GMO has created problems with patent grant
2.	GNOs are only made to serve as models for human diseases so that investigation of new treatments for diseases is made possible
3.	To check the use of GMO in molecular diagnosis
4.	To check the safety of introducing GMO for public services

25 Read the following statements regarding RNAi.

(A)	It is a method of cellular defense in all prokaryotic organisms.
(B)	This method has been used to make nematode resistant tobacco plants.
(C)	It is a post translational method of silencing of genes.

Of the above statements
1. Only statement **(A)** is incorrect
2. Both **(B)** & **(C)** are incorrect
3. Only **(B)** is correct
4. Both **(A)** & **(C)** are correct

26 Which of the following processes is involved to control parasite Meloidogyne incognita?
1. Process based on chemical control
2. Process based on RNA interference
3. Toxin coded by a gene CrylAc
4. Recombinant DNA-technology

27

Assertion (A):	GEAC will decide the safety of introducing GM organism for public use.
Reason (R):	Genetic modifications of organisms may have opposite results when introduced into the ecosystem.

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 but **(R)** is False.
4.	**(A)** is False but **(R)** is True.

28 Match column-I with column-II and choose the correct option.

	Column-I		Column-II
a.	Biosynthetic stage	(i)	Increased surface area for oxygen transfer
b.	Downstream procession	(ii)	Large-scale production in fermenter
c.	Sparged stirred-tank bioreactor	(iii)	With foam braker and flat bladed impeller
d.	Simple stirred-tank bioreactor	(iv)	Separation and purification

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

29 Select the option that fills in the blank correctly :
Using _____vectors, nematode-specific genes were introduced into the host plant for pest resistance.
1. *Streptococcus*
2. *Bacillus anthracis*
3. *Agrobacterium*
4. *Haemophilus influenzae*

30 The vector used for delivery of ADA cDNA into cells of a patient receiving gene therapy is
1. *Agrobacterium*
2. *Reovirus*
3. *E.coli*
4. *Retrovirus*

31 Which step of Government of India has taken to cater to the requirement of patent terms and other emergency provisions in this regard?
1. RTI Act
2. NGO Act
3. Indian patents Bill
4. Biopiracy Act

32

Assertion (A):	Gene therapy is a method of treating a disorder but cannot cure it.
Reason (R):	Cells are drawn from a patient and the functional gene is introduced into these cells and transferred back to the patient.

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 but **(R)** is False.
4.	**(A)** is False but **(R)** is True.

33

Assertion (A):	RNAi is a method of obtaining pest resistance in plants.
Reason (R):	The pest specific foreign DNA introduced in host plant prevents translation of pathogenic mRNA.

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

34 How many applications given below are of biotechnology?
(a) Bioremediation
(b) Waste treatment
(c) Energy production
(d) Therapeutic
Select the correct option.
1. Two
2. Four
3. Three
4. One

ZOOLOGY - SECTION B

35 Which of the following is best for effective treatment of disease?

1.	Early diagnosis only
2.	Understanding the pathophysiology only
3.	Diagnosing only after the symptoms have manifested
4.	Early diagnosis and understanding its pathophysiology

36 Mark the incorrect statement.

1.	Norman Borlaug is considered as father of green revolution
2.	Green revolution leads to enhanced production of wheat and rice
3.	Techniques used during green revolution led to tripling of the yield
4.	Use of biofertilizers, biopesticides was promoted heavily during green revolution

37

Assertion (A):	One antibiotic resistance gene of vector pBR322 helps in selecting the transformants and the other one in selecting recombinants.
Reason (R):	The non-recombinants can grow on both antibiotic-rich media while the recombinants grow only on single medium due to insertional inactivation.

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

38 Mark the correct option regarding benefits of genetically modified (GM) plants.

1.	They are more susceptible to abiotic stress
2.	All of the GM plants are nutrient deficient
3.	Pest resistant plants have reduced reliance on chemical pesticides
4.	Their increased efficiency of mineral usage has led to depletion of nutrients in soil

39

Assertion (A):	Mature insulin is a tripeptide
Reason (R):	Mature insulin contains A, B and C chains.

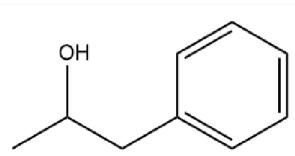
1.	Both **(A)** and **(R)** are True and the **(R)** is the correct explanation of the **(A)**.
2.	Both **(A)** and **(R)** are True and the **(R)** is not the correct explanation of the **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	Both **(A)** and **(R)** are False.

40 Which is not true w.r.t. transgenic animals and their contribution to human welfare?
1. Transgenic mice are being tested to ensure safety of polio vaccine
2. Rosie's milk contained human gene—insulin
3. Transgenic cows produce milk with less fat
4. Transgenic sheep grow more wool

CHEMISTRY - SECTION A

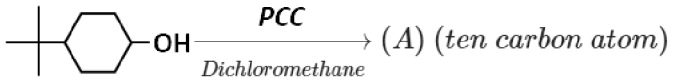
41 The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether.
A, B and C are respectively:
1. C_2H_5OH, C_2H_6, C_2H_5Cl
2. C_2H_5OH, C_2H_5Cl, C_2H_5ONa
3. C_2H_5Cl, C_2H_6, C_2H_5OH
4. C_2H_5OH, C_2H_5ONa , C_2H_5Cl

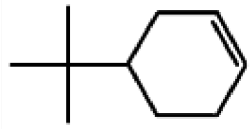
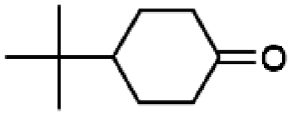
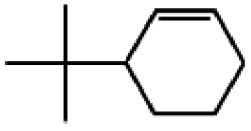
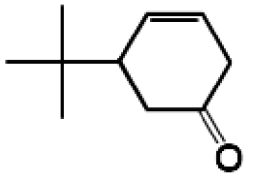
42 The IUPAC name of the above compound is:



1. 1-Phenylpropan-2-ol
2. 2-Phenylpropan-2-ol
3. 1-Phenylpropan-1-ol
4. 2-Phenylpropan-1-ol

43 The structure of A in the below mentioned reaction is:



1.		2.	
3.		4.	

44 The product 'Z' in the below-mentioned reaction is:

$$\text{Phenol} \xrightarrow{\text{Zn Dust}} X \xrightarrow[\text{Anhy. } AlCl_3]{CH_3Cl} Y$$

$$Y \xrightarrow[KMnO_4]{\text{Alkaline}} Z$$

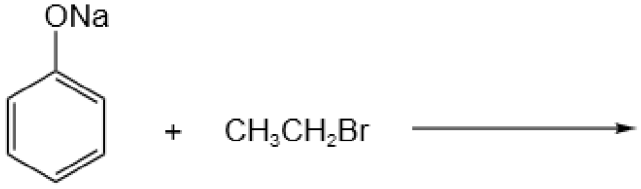
1. Toluene
2. Benzaldehyde
3. Benzoic acid
4. Benzene

45 Select the correct option based on statements below:

Assertion (A):	p-Nitrophenol is more acidic than phenol.
Reason (R):	Nitro group helps in the stabilization of the phenoxide ion by dispersal of negative charge due to resonance.

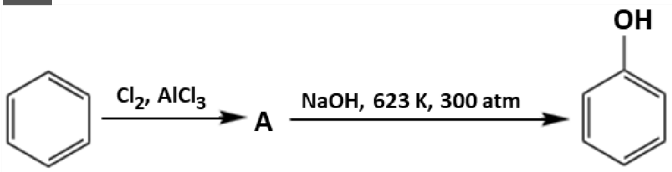
1.	Both **(A)** and **(R)** are True and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are True but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is True but **(R)** is False.
4.	**(A)** is False but **(R)** is True.

46 The main product of Williamson's ether synthesis reaction will be:



1. Benzene
2. Methoxy benzene
3. Ethoxy benzene
4. Ethane

47 "A" in the reaction below is:

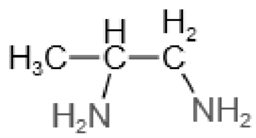
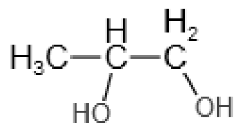
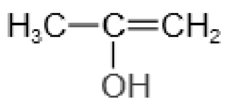


1.	Chlorobenzene	2.	1,2-Dichlorobenzene
3.	1,3-dichlorobenzene	4.	None of these

48 Z in the reaction below is:

$$CH_3CH_2CH_2OH \xrightarrow[160-180^\circ C]{Conc.\ H_2SO_4} X \xrightarrow{Br_2} Y$$

$$Y \xrightarrow[2.\ NaNH_2]{1.\ Alc.\ KOH} Z$$

1.		2.	
3.		4.	$CH_3 - C \equiv CH$

49 The product 'Z' in the below-mentioned reaction is:

Ethanol $\xrightarrow{PBr_3}$ X $\xrightarrow{alc.\ KOH}$ Y

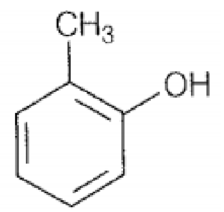
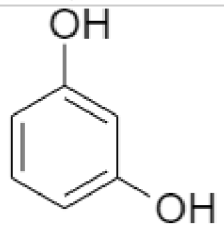
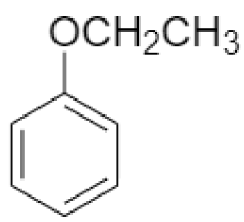
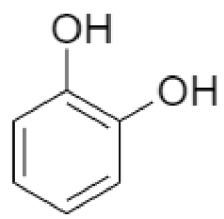
Y $\xrightarrow[(ii)\ H_2O,\ heat]{(i)\ H_2SO_4,\ room\ temperature}$ Z

1. $CH_2 = CH_2$
2. $CH_3CH_2 - O - CH_2 - CH_3$
3. $CH_3 - CH_2 - O - SO_3H$
4. CH_3CH_2OH

50 The below conversion can be carried out by:

1.	$NaBH_4$	2.	$LiAlH_4$
3.	*PCC*	4.	$KMnO_4$

51 Match the structures of the compounds given in Column I with the name of the compounds given in Column II.

Column I		Column II	
A.		1.	Phenetole
B.		2.	o-Cresol
C.		3.	Catechol
D.		4.	Resorcinol

Codes

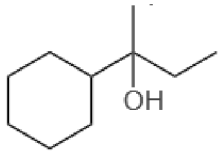
	A	B	C	D
1.	2	4	1	3
2.	3	1	4	2
3.	1	4	3	2
4.	4	3	2	1

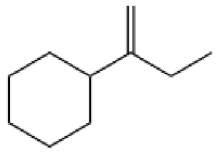
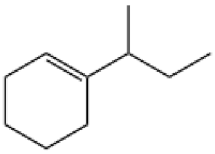
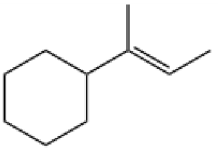
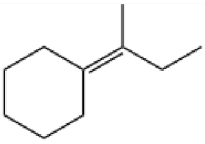
52 Z in the given below reaction is:

$$CH_3CH_2CH = CH_2 \xrightarrow[H_2O,\ H_2O_2,\ OH^-]{B_2H_6} Z$$

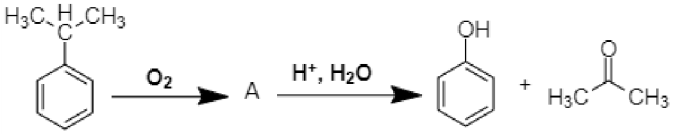
1.	$CH_3CH_2CH_2CH_2OH$	2.	$CH_3CH_2\overset{}{C}HCH_3$ with OH on C-2 ($CH_3CH_2CH(OH)CH_3$)
3.	$CH_3CH_2CH_2CHO$	4.	$CH_3CH_2CH_2CH_3$

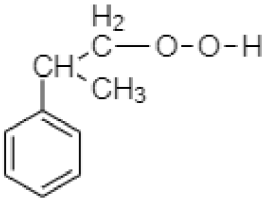
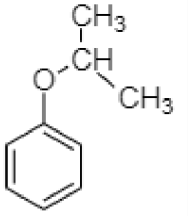
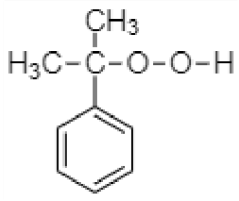
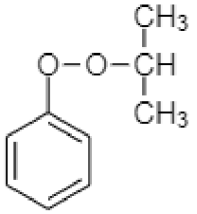
53 Upon dehydration, the below mentioned compound will not give:



1.		2.	
3.		4.	

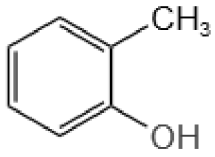
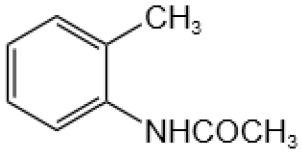
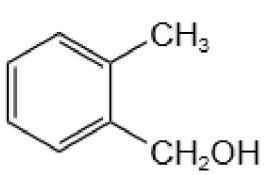
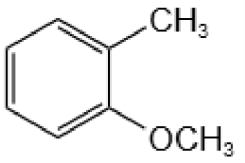
54 The structure of intermediate A in the following reaction is:



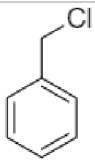
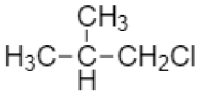
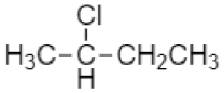
1.		2.	
3.		4.	

CHEMISTRY - SECTION B

55 The most reactive compound among the following toward electrophilic aromatic substitution reaction is:

1.		2.	
3.		4.	

56 When hydrolyzed with aqueous KOH, compounds that undergoes racemization are:

(i)		(ii)	$CH_3CH_2CH_2Cl$
(iii)		(iv)	
1.	(i) and (ii)	2.	(ii) and (iv)
3.	(iv) only	4.	(i) and (iv)

57 Select the correct option based on statements below:

Assertion (A):	Vinyl chloride can be easily hydrolyzed.
Reason (R):	Resonance is not observed in vinyl chloride.

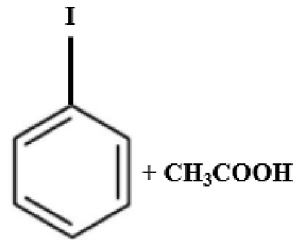
1.	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is true but **(R)** is false.
4.	Both **(A)** and **(R)** are false.

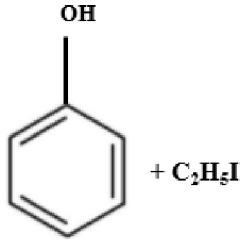
58 Select the correct option based on statements below:

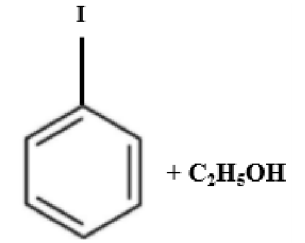
Assertion (A):	The boiling points of alkyl halides decrease in the order RI> RBr > RCl > RF
Reason (R):	The boiling points of alkyl chlorides, bromides, and iodides are considerably higher than those of the hydrocarbons of comparable molecular mass.

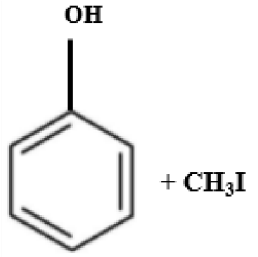
1. Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
2. Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
3. **(A)** is true but **(R)** is false.
4. **(A)** is false but **(R)** is true.

59 Anisole on reaction with HI gives:

1. 

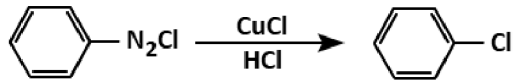
2. 

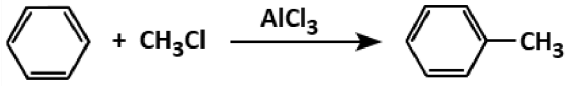
3. 

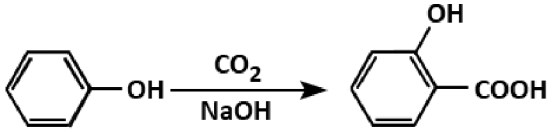
4. 

60 Sandmeyer's reaction described by among the following is:

1. $2HCHO \xrightarrow{NaOH} CH_3OH + HCOONa$

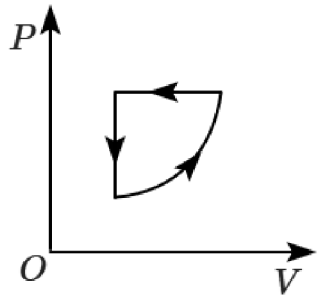
2. 

3. 

4. 

PHYSICS - SECTION A

61 Which one of the following is correct for one complete cycle of a thermodynamic process on a gas as shown in the $(P-V)$ diagram?



1.	$\Delta E_{int}=0, Q<0$	2.	$\Delta E_{int}=0, Q>0$
3.	$\Delta E_{int}>0, Q<0$	4.	$\Delta E_{int}<0, Q>0$

62 How much kinetic energy will be gained by an α-particle in going from a point at 70 V to another point at 50 V?

1.	40 eV	2.	40 keV
3.	40 MeV	4.	0

63 The angle between equipotential surface and electric lines of force is:

1.	zero	2.	180°
3.	90°	4.	45°

64 If 50 J of work must be done to move an electric charge of 2 C from a point where the potential is -10 volt to another point where the potential is V volt, then the value of V is:

1. 5 volt
2. -15 volt
3. $+15$ volt
4. $+10$ volt

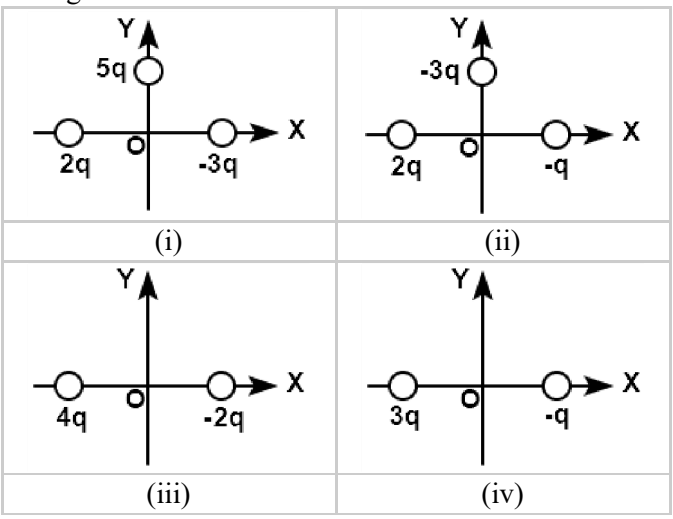
65 We have two vessels of equal volume, one filled with hydrogen and the other with equal mass of helium. The common temperature is $27^{\circ}C$. What is the relative number of molecules in the two vessels?

1. $\frac{n_H}{n_{He}} = \frac{1}{1}$
2. $\frac{n_H}{n_{He}} = \frac{5}{1}$
3. $\frac{n_H}{n_{He}} = \frac{2}{1}$
4. $\frac{n_H}{n_{He}} = \frac{3}{1}$

66 On rotating a point charge having a charge q around a charge Q in a circle of radius r, the work done will be:

1.	$q \times 2\pi r$	2.	$\frac{q \times 2\pi Q}{r}$
3.	zero	4.	$\frac{Q}{2\varepsilon_0 r}$

67 In the following four situations, charged particles are at an equal distance from the origin. Arrange the magnitude of the net electric field at origin, starting with the highest.



1.	(i) > (ii) > (iii) > (iv)	2.	(ii) > (i) > (iii) > (iv)
3.	(i) > (iii) > (ii) > (iv)	4.	(iv) > (iii) > (ii) > (i)

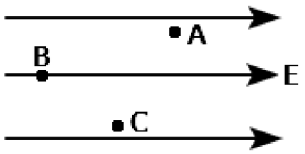
68 The electric potential at a point in free space due to a charge Q coulomb is $Q \times 10^{11}$ V. The electric field at that point is:

1. $4\pi\varepsilon_0 Q \times 10^{22}$ V/m
2. $12\pi\varepsilon_0 Q \times 10^{20}$ V/m
3. $4\pi\varepsilon_0 Q \times 10^{20}$ V/m
4. $12\pi\varepsilon_0 Q \times 10^{22}$ V/m

69 A steel wire 0.72 m long has a mass of 5×10^{-3} kg. If the wire is under tension of 60 N, the speed of transverse waves on the wire will be:

1. 85 m/s
2. 83 m/s
3. 93 m/s
4. 100 m/s

70 A, B and C are three points in a uniform electric field. The electric potential is:



1.	maximum at A
2.	maximum at B
3.	maximum at C
4.	same at all the three points A, B and C

71 What is the potential energy of two equal positive point charges of 1 μC each held 1 m apart in the air?

1.	9×10^{-3} J	2.	9×10^{-3} eV
3.	2 eV/m	4.	zero

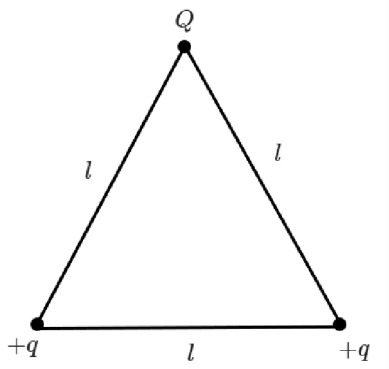
72 A particle executing simple harmonic motion of amplitude 5 cm has a maximum speed of 31.4 cm/s. The frequency of its oscillation will be:

1. 1 Hz
2. 3 Hz
3. 2 Hz
4. 4 Hz

73 An electric dipole of moment p is placed in an electric field of intensity E. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when $\theta = 90^\circ$, the torque and the potential energy of the dipole will respectively be:

1.	$pE\sin\theta, -pE\cos\theta$	2.	$pE\sin\theta, -2pE\cos\theta$
3.	$pE\sin\theta, 2pE\cos\theta$	4.	$pE\cos\theta, -pE\sin\theta$

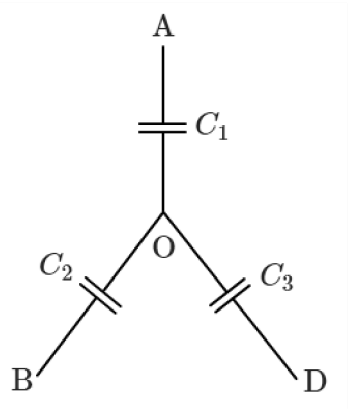
74 Three charges Q, $+q$ and $+q$ are placed at the vertices of an equilateral triangle of side l as shown in the figure. If the net electrostatic energy of the system is zero, then Q is equal to:



1.	$-\frac{q}{2}$	2.	$-q$
3.	$+q$	4.	zero

PHYSICS - SECTION B

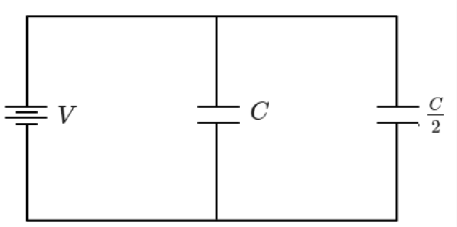
75 Three uncharged capacitors of capacities C_1, C_2 and C_3 are connected to one another as shown in the figure.



If points A, B, and D, are at potential V_1, V_2 and V_3 then the potential at O will be:

1. $\frac{V_1C_1+V_2C_2+V_3C_3}{C_1+C_2+C_3}$
2. $\frac{V_1+V_2+V_3}{C_1+C_2+C_3}$
3. $\frac{V_1(V_2+V_3)}{C_1(C_2+C_3)}$
4. $\frac{V_1V_2V_3}{C_1C_2C_3}$

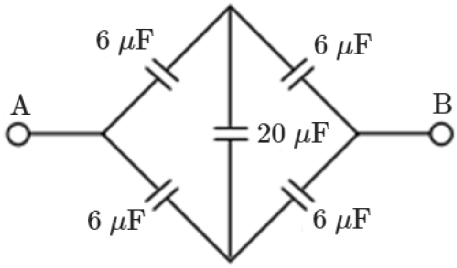
76 Two condensers, one of capacity C and the other of capacity $\frac{C}{2}$ are connected to a V volt battery, as shown in the figure.



The energy stored in the capacitors when both condensers are fully charged will be:

1. $2CV^2$
2. $\frac{1}{4}CV^2$
3. $\frac{3}{4}CV^2$
4. $\frac{1}{2}CV^2$

77 The effective capacity of the network between terminals A and B is:



1. 6 μF
2. 20 μF
3. 3 μF
4. 10 μF

78 What is the area of the plates of a 2 F parallel plate capacitor, given that the separation between the plates is 0.5 cm?

1. 1100 km^2
2. 1130 km^2
3. 1110 km^2
4. 1105 km^2

79 Which of the following statements is correct regarding electrostatics of conductors?

1.	The interior of the conductor with no cavity can have no excess charge in the static situation.
2.	Electrostatic potential is constant throughout the volume of the conductor.
3.	Electrostatic potential has the same value inside as that on its surface.
4.	All of these.

80 A parallel plate condenser has a capacitance 50 μF in air and 110 μF when immersed in an oil. The dielectric constant k of the oil is:

1. 0.45
2. 0.55
3. 1.10
4. 2.20

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.