NEET (2024)

PRACTICE TEST-05

DURATION : 200 Minutes | **M. MARKS : 720**

Topics Covered

Physics :	Electromagnetic Induction Complete.
Chemistry :	Alcohol, Phenol and Ether (Complete Chapter).
Biology :	**(Botany):** Molecular Basis of Inheritance, Transcription, Genetic Code Translation.
	(Zoology): Biotechnology: Principles and Processes (Full Chapter).

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 min**. duration.
3. The test booklet consists of **200** questions. The maximum marks are **720**.
4. There are four Section in the Question Paper, Section I, II, III & IV consisting of Section-I **(Physics)**, Section-II **(Chemistry)**, Section-III **(Botany)** & Section IV **(Zoology)** and having **50 Questions** in each Subject and each subject is divided in two Section, **Section A** consisting 35 questions (all questions all compulsory) and **Section B** consisting 15 Questions (Any 10 questions are compulsory).
5. There is only one correct response for each question.
6. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

SECTION-I (PHYSICS)

SECTION – A

1. An induced e.m.f. is produced when a magnet is plunged into a coil. The strength of the induced e.m.f. is independent of

(1) The strength of the magnet
(2) Number of turns of coil
(3) The resistivity of the wire of the coil
(4) Speed with which the magnet is moved

2. Which of the following represents correct formula for magnetic flux?

(1) $d\phi = \vec{ds} \times \vec{B}$ (2) $d\phi = \vec{v}.\vec{B}$
(3) $d\phi = \vec{B}.\vec{ds}$ (4) $d\phi = \vec{B}.\vec{dl}$

3. Magnetic flux is

(1) Total charge per unit area.
(2) Total current through a surface.
(3) Total number of magnetic field lines passing normally through given area.
(4) Total e.m.f. in closed circuit.

4. A metallic ring with a cut is held horizontally and a magnet is allowed to fall vertically through the ring, then the acceleration of this magnet is _____.

(1) Equal to g
(2) More than g
(3) Less than g
(4) Sometimes less and sometimes more than g

5. A magnet is moved towards a coil (i) quickly (ii) slowly, then the induced e.m.f. is

(1) larger in case (i)
(2) smaller in case (i)
(3) equal to both the cases
(4) larger or smaller depending upon the radius of the coil

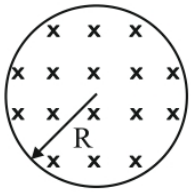
6. Which of the following units denotes the dimension $\frac{ML^2}{Q^2}$, where Q denotes the electric charge?

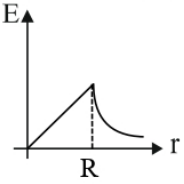
(1) Wb/m^2 (2) henry (H)
(3) H/m^2 (4) weber (Wb)

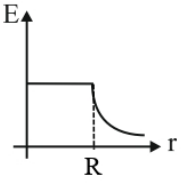
7. The emf is induced in a single, isolated coil due to ...*A*... of flux through the coil by means of varying the current through the same coil. This phenomenon is called ...*B*... Here, *A* and *B* refer to

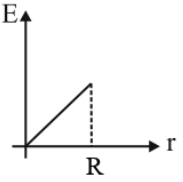
(1) Constancy, mutual induction
(2) Change, self induction
(3) Constancy, self induction
(4) Changes, mutual induction

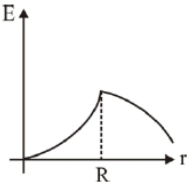
8. A cylindrical space of radius R is filled with a uniform magnetic induction B parallel to the axis of the cylinder. If B changes at a constant rate, the graph showing the variation of induced electric field with distance r from the axis of cylinder is _____.



(1) 

(2) 

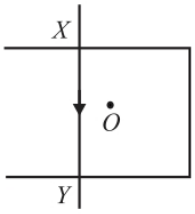
(3) 

(4) 

9. An inductor may store energy in

(1) its electric field
(2) its coils
(3) its magnetic field
(4) both in electric and magnetic fields

10. When a conducting wire XY is moved towards the right, a current flows in the anti-clockwise direction. Direction of magnetic field at point O is_____:



(1) Parallel to motion of wire
(2) Along XY
(3) Perpendicular outside the paper
(4) Perpendicular inside the paper

11. Two pure inductors each of self inductance L are connected in series, the net inductance is

(1) L (2) $2L$
(3) $L/2$ (4) $L/4$

12. When current i passes through an inductor of self inductance L, energy stored in it is 1/2. Li^2. This is stored in the

(1) Current (2) Voltage
(3) Magnetic field (4) Electric field

13. A neutral metallic ring is placed in a circular symmetrical uniform inward magnetic field with its plane perpendicular to the field. If the magnitude of field starts increasing with time, then_____.

(1) The ring starts translating

(2) The ring starts rotating about its axis

(3) The ring slightly contracts

(4) The ring starts rotating about a diameter

14. Eddy currents do not produce

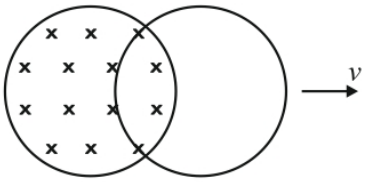
(1) Heat

(2) A loss of energy

(3) Spark

(4) Damping of motion

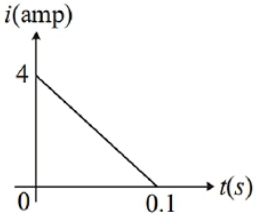
15. A uniform magnetic field $B = 0.5T$ exists in a circular region of radius $R = 5m$. A loop of radius $R = 5m$ encloses the magnetic field at $t = 0$ and then pulled at uniform speed $v = 2$ m s^{-1} in the plane of the paper. Find the induced emf (in V) in the loop at time $t = 3s$ _____.



(1) 8V (2) 4V

(3) 6V (4) 10V

16. In a coil of resistance 10 Ω, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in weber is



(1) 8 (2) 2

(3) 6 (4) 4

17. Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon

I. relative position and orientation of the two coils

II. the materials of the wires of the coils

III. the rates at which currents are changing in the two coils Which of the above statements is/are correct?

(1) I only

(2) II only

(3) I and III

(4) II and III

18. Match the column-I and column-II

Column I		Column II	
(A)	AC generator	(P)	Eddy current
(B)	DC motor	(Q)	Slip rings
(C)	Dead beat galvanometer	(R)	Split ring
(D)	Solenoid	(S)	Insulated copper wire wound in the form of a cylindrical coil

(1) $A \rightarrow R; B \rightarrow Q; C \rightarrow P; D \rightarrow S$

(2) $A \rightarrow S; B \rightarrow Q; C \rightarrow P; D \rightarrow R$

(3) $A \rightarrow Q; B \rightarrow R; C \rightarrow P; D \rightarrow S$

(4) $A \rightarrow Q; B \rightarrow P; C \rightarrow R; D \rightarrow S$

19. A 1.0 m long metallic rod is rotated with an angular frequency of 400 rad s^{-1} about an axis normal to the rod passing through its one end. The other end of the rod is in contact with a circular metallic ring. A constant and uniform magnetic field of 0.5 T parallel to the axis exists everywhere. Calculate the emf developed between the centre and the ring.

(1) 100 V (2) 200 V

(3) 50 V (4) 150 V

20. The phenomenon called electromagnetic induction was first investigated by

(1) Newton (2) Kepler

(3) Faraday (4) Galileo

21. **Assertion:** Lenz's law violates the principle of conservation of energy.

Reason: Induced emf always opposes the change in magnetic flux responsible for its production.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(3) Assertion is correct, reason is incorrect

(4) Assertion is incorrect, reason is correct.

22. **Assertion:** An induced current has a direction such that the magnetic field due to the current opposes the change in the magnetic flux that induces the current.

Reason: Above statement is in accordance with conservation of energy.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

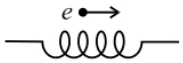
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(3) Assertion is correct, reason is incorrect

(4) Assertion is incorrect, reason is correct.

23. **Assertion:** Acceleration of a magnet falling through a long solenoid decreases.
Reason: The induced current produced in a circuit always flow in such direction that it opposes the change to the cause that produced it.
(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(3) Assertion is correct, reason is incorrect
(4) Assertion is incorrect, reason is correct.

24. **Assertion:** Figure shows an emf e induced in a coil. It happens due to rightward decreasing current.



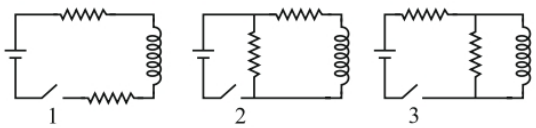
Reason: In the coil self induced emf $e = -L\frac{di}{dt}$.
(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(3) Assertion is correct, reason is incorrect
(4) Assertion is incorrect, reason is correct.

25. If a current increases from zero to one ampere in 0.1 second in a coil of 5 mH, then the magnitude of the induced e.m.f. will be
(1) 0.005 volt (2) 0.5 volt
(3) 0.05 volt (4) 5 volt

26. A coil of resistance 400Ω is placed in a magnetic field. If the magnetic flux ϕ (wb) linked with the coil varies with time t (sec) as $\phi = 50\,t^2 + 4$. The current in the coil at $t = 2$ sec is
(1) 0.5 A (2) 0.1 A
(3) 2A (4) 1 A

27. A coil having an area A_0 is placed in a magnetic field normal to plane of coil which changes from B_0 to $4\,B_0$ in time interval t. The e.m.f. induced in the coil will be
(1) $3A_0B_0/t$ (2) $4\,A_0B_0/t$
(3) $3\,B_0/A_0\,t$ (4) $4\,A_0/B_0\,t$

28.



The figure shows three circuits with identical batteries, inductors and resistances. Rank the circuits according to the currents through the battery just after the switch is closed, greatest first_____.
(1) $I_2 > I_3 > I_1$ (2) $I_2 > I_1 > I_3$
(3) $I_1 > I_2 > I_3$ (4) $I_1 > I_3 > I_2$

29. The flux linked with a coil at any instant 't' is given by $\phi = 10\,t^2 - 50\,t + 250$. The induced emf at $t = 3$s is
(1) – 190 V (2) – 10 V
(3) 10V (4) 190V

30. A copper rod of length l rotates about its end with angular velocity ω in uniform magnetic field B. The emf developed between the ends of the rod if the field is normal to the plane of rotation is
(1) $B\omega l^2$ (2) $\frac{1}{2}B\omega l^2$
(3) $2\,B\omega l^2$ (4) $\frac{1}{4}B\omega l^2$

31. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charge Q that passes any point in the circuit during the time Δt is represented by
(1) $Q = R.\frac{\Delta\phi}{\Delta t}$ (2) $Q = \frac{1}{R}.\frac{\Delta\phi}{\Delta t}$
(3) $Q = \frac{\Delta\phi}{R}$ (4) $Q = \frac{\Delta\phi}{\Delta t}$

32. The north pole of a bar magnet is moved towards a coil along the axis passing through the centre of the coil and perpendicular to the plane of the coil. The direction of the induced current in the coil when viewed in the direction of the motion of the magnet is
(1) Clockwise
(2) Anti-clockwise
(3) No current in the coil
(4) Either clockwise or anti-clockwise

33. A boy peddles a stationary bicycle and the pedals of bicycle are attached to a 200 turn coil of area 0.10 m^2. The coil rotates at half a revolution per second and it is placed in a uniform magnetic field of 0.02 T perpendicular to the axis of rotation of the coil. The maximum voltage generated in the coil is
(1) 1.26 V (2) 2.16V
(3) 3.24 V (4) 4.12 V

34. A conducting circular loop is placed in a uniform magnetic field, $B = 0.025\ T$ with its plane perpendicular to the magnetic field. The radius of the loop is made to shrink at a constant rate of 1 mm s^{-1}. The induced e.m.f. in the loop when the radius is 2 cm ?
(1) $2\,\pi\mu V$ (2) $\pi\mu V$
(3) $\frac{\pi}{2}\mu V$ (4) $2\,\mu V$

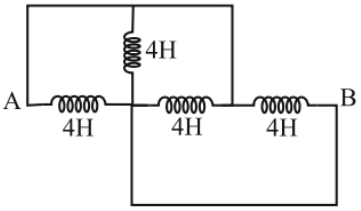
35. A coil of 50 turns is pulled in 0.02 s between the poles of a magnet, where its area includes 31×10^{-6} Wb to 1×10^{-6} Wb. The average e.m.f. is

(1) 7.5×10^{-2} V (2) 7.5×10^{-3} V

(3) Zero (4) 7.5×10^{-4} V

SECTION – B

36. The equivalent inductance between A and B is _____.



(1) 1 H (2) 4 H

(3) 0.8 H (4) 16 H

37. Two coaxial coils are very close to each other, and their mutual induced is 5 mH. If a current 50 sin 500t is passed in one of the coils then the peak value of inductance e.m.f. in the secondary coil will be _____.

(1) 5000 V (2) 500 V

(3) 150 V (4) 125 V

38. A 100 millihenry coil carries a current of 1 ampere. Energy stored in its magnetic field is

(1) 0.5 J (2) 1 J

(3) 0.05 J (4) 0.1 J

39. Two solenoids of same cross-sectional area have their lengths and number of turns in ratio of 1 : 2. The ratio of self-inductance of two solenoids is

(1) 1:1 (2) 1:2

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

40. A copper disc of radius 0.1 m rotated about its centre with 10 revolutions per second in a uniform magnetic field of 0.1 tesla with its plane perpendicular to the field. The e.m.f. induced across the radius of disc is

(1) $\frac{\pi}{10}$ volt

(2) $\frac{2\pi}{10}$ volt

(3) $\pi \times 10^{-2}$ volt

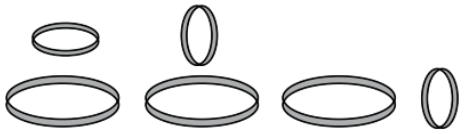
(4) $2\pi \times 10^{-2}$ volt

41. The mutual inductance between a primary and secondary circuits is 0.5 H. The resistance of the primary and the secondary circuit are 20 ohms and 5 ohms respectively. To generate a current of 0.4 A in the secondary, current in the primary must be changed at the rate of _____.

(1) 4.0 A/s (2) 16.0 A/s

(3) 1.6 A/s (4) 8.0 A/s

42. Two circular coils can be arranged in any of the three situations shown in the figure. Their mutual inductance will be _____.



(1) Maximum in situation (A)

(2) Maximum in situation (B)

(3) Maximum in situation (C)

(4) The same in all situations

43. **Assertion:** When number of turns in a coil is doubled, coefficient of self-inductance of the coil becomes 4 times.

Reason: This is because $L \propto N^2$.

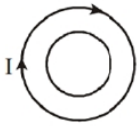
(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(3) Assertion is correct, reason is incorrect

(4) Assertion is incorrect, reason is correct.

44. Two different wire loops are concentric and lie in the same plane. The current in the outer loop (I) is clockwise and increases with time. The induced current in the inner loop



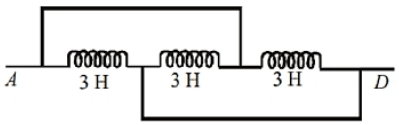
(1) is clockwise

(2) is zero

(3) is counter clockwise

(4) has a direction that depends on the current

45. The inductance between A and D is



(1) 3.66 H (2) 9 H

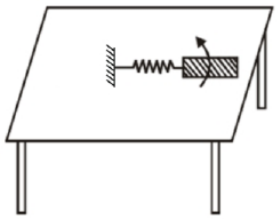
(3) 0.66 H (4) 1 H

46. An L-R circuit has a cell of emf E, which is switched on at time $t = 0$. The current in the circuit after a long time will be _____.

(1) Zero (2) $\frac{E}{R}$

(3) $\frac{E}{L}$ (4) $\frac{E}{\sqrt{L^2 + R^2}}$

47. A metallic rod of length 'ℓ' is tied to a string of length 2ℓ and made to rotate with angular speed ω on a horizontal table with one end of the string fixed. If there is a vertical magnetic field 'B' in the region, the e.m.f. induced across the ends of the rod is



(1) $\frac{7B\omega\ell^2}{2}$ (2) $\frac{3B\omega\ell^2}{2}$

(3) $\frac{4B\omega\ell^2}{3}$ (4) $\frac{5B\omega\ell^2}{2}$

48. Two coils of self inductances L_1 and L_2 are placed so close together that effective flux in one coil is completely linked with the other. If M is the mutual inductance between them, then

(1) $M = L_1L_2$ (2) $M = L_1/L_2$

(3) $M = (L_1L_2)^2$ (4) $M = \sqrt{(L_1L_2)}$

49. The mutual inductance of a pair of coils, each of N turns, is M henry. If a current of I ampere in one of the coils is brought to zero in t second, the emf induced per turn in the other coil, in volt, will be

(1) $\frac{MI}{t}$

(2) $\frac{NMI}{t}$

(3) $\frac{MN}{It}$

(4) $\frac{MI}{Nt}$

50. In a series $L - R$ growth circuit, if maximum current and maximum induced emf in an inductor of inductance 3mH are 2A and 6V respectively, then the time constant of the circuit is _____.

(1) 1 ms

(2) 1/3 ms

(3) 1/6 ms

(4) 1/2 ms

SECTION-II (CHEMISTRY)

SECTION – A

51. When phenol is treated with excess of bromine water, it gives

(1) m-bromophenol

(2) o- and p-bromophenol

(3) 2,4-dibromophenol

(4) 2,4,6-tribromophenol

52. Phenol is less acidic than

(1) p-nitrophenol (2) Ethanol

(3) Cresol (4) benzyl alcohol

53. The compound in which hydrogen bonding is not possible is:

(1) CH_3OCH_3 (2) CH_3CH_2OH

(3) H_2O (4) CH_3COOH

54. Which of the following is formed when a diethyl ether is exposed to air for longer period?

(1) Ethyl alcohol

(2) Acetaldehyde

(3) Ethylene

(4) Peroxide of diethyl ether

55. The reaction $2ROH + 2Na \rightarrow 2RONa + H_2$ suggests that alcohols are:

(1) Basic (2) Amphoteric

(3) Neutral (4) Acidic

56. Which of the following reaction conditions are used for the conversion of ethanol to ethylene?

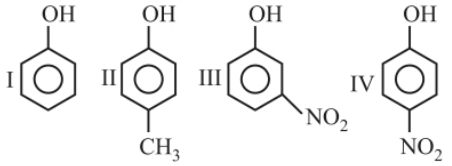
(1) conc. H_2SO_4/70°C

(2) dil. H_2SO_4/140°C

(3) dil. H_2SO_4/100°C

(4) conc. H_2SO_4/170°C

57. In the following compounds, the decreasing order of acidity is



(1) I > IV > III > II (2) II > IV > I > II

(3) II > I > III > IV (4) IV > III > I > II

58. From amongst the following alcohols, the one that would react fastest with conc. HCl and anhydrous $ZnCl_2$ is

(1) 1-Butanol

(2) 2-Butanol

(3) 2-Methylpropan-2-ol

(4) 2-Methylpropanol-1

59. Phenol is also called

(1) Salicylic acid (2) Benzyl alcohol

(3) Carbolic acid (4) Salol

60. Which of the following alcohols gives the best yield of dialkyl ether on being heated with a trace of sulphuric acid?

(1) 2-Pentanol (2) 2-Methyl-2-butanol
(3) 1-Pentanol (4) 2-Propanol

61. In the reaction,

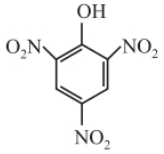
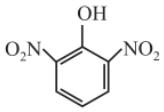
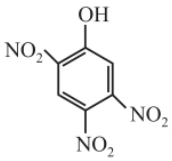
acetone $\xrightarrow{\text{Red}^n}$ B $\xrightarrow[\Delta]{\text{dil.}H_2SO_4}$ C, C is :

(1) Propene
(2) But-1-ene
(3) Iso-butyl alcohol
(4) n-butyl alcohol

62. Phenol $\xrightarrow[\text{(i) } H^+]{\text{(i) } CHCl_3/NaOH}$ Salicylaldehyde. This reaction is known as

(1) Gattermann aldehyde synthesis
(2) Sandmeyer's reaction
(3) Perkin's reaction
(4) Reimer-Tiemann reaction

63. Which one of the following is obtained when phenol is shaken with excess of conc. HNO_3?

(1) 
(2) 
(3) 
(4) None of these

64. Identify B in the following sequence,

$CH_3CH_2CH_2OH \xrightarrow{PCl_5} A \xrightarrow{\text{alc.KOH}} B$:

(1) Propyne (2) Propene
(3) Propanol (4) Propanone

65. Which of the following is a simple ether?

(1) $C_2H_5OCH_3$ (2) CH_3OCH_3
(3) $C_6H_5OCH_3$ (4) $C_6H_5OC_2H_5$

66. An alkyl halide may be converted into an alcohol by–

(1) Addition
(2) Substitution
(3) Dehydrohalogenation
(4) Elimination

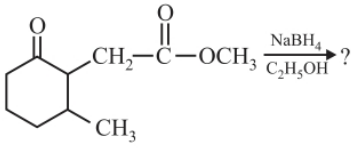
67. *Tert*-butyl methyl ether on heating with anhydrous HI in ether gives–

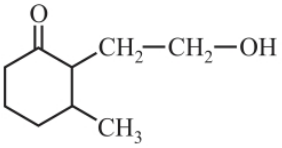
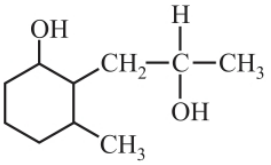
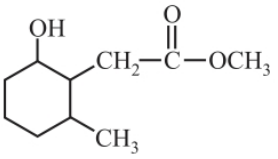
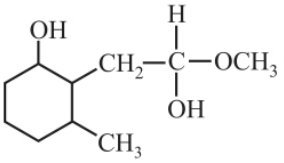
(1) $CH_3OH + (CH_3)_3CI$
(2) $CH_3I + (CH_3)_3COH$
(3) $CH_3I + (CH_3)_3CI$
(4) None of the above

68. The correct order of boiling point for primary (1°), secondary (2°) and tertiary (3°) alcohols is:

(1) 1° > 2° > 3° (2) 3° > 2° > 1°
(3) 2° > 1° > 3° (4) 2° > 3° > 1°

69. The product formed in the following chemical reaction is:



(1) 
(2) 
(3) 
(4) 

70. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is:

(1) Benzoic acid (2) Salicylaldehyde
(3) Salicylic acid (4) Phthalic acid

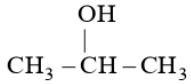
71. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with:

(1) Conc. HCl/ anhydrous $ZnCl_2$
(2) KCN
(3) NaOCl
(4) Cl_2

72. Br_2 dissolved in CS_2 reacts with phenol at 273 K to give …… as the major product

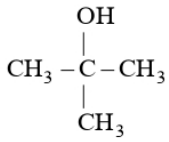
(1) o-Bromophenol
(2) m - Bromophenol
(3) p-Bromophenol
(4) 2,4,6-Tribromophenol

73. Lucas reagent reacts fastest with:

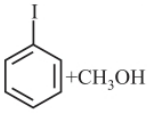
(1) 

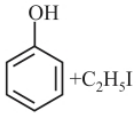
(2) $C_2H_5CH_2OH$

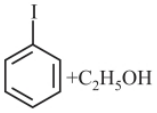
(3) CH_3OH

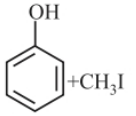
(4) 

74. Anisole on cleavage with HI gives:

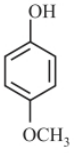
(1) 

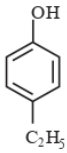
(2) 

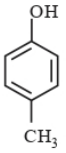
(3) 

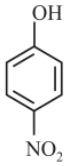
(4) 

75. Which of the following substituted phenols is the strongest acid?

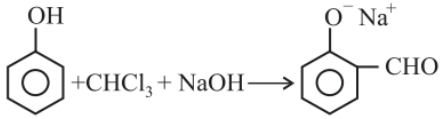
(1) 

(2) 

(3) 

(4) 

76. In the reaction, the electrophile involved is:



(1) Dichloromethyl cation $\left(\overset{\oplus}{C}HCl_2\right)$

(2) Formyl cation $\left(\overset{\oplus}{C}HO\right)$

(3) Dichlorocarbene ($:CCl_2$)

(4) Dichloromethyl anion $\left(\overset{\ominus}{C}HCl_2\right)$

77. Identify Z in the sequence of reactions:

$CH_3CH_2CH = CH_2$

$\xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$

(1) $(CH_3)_2CH - O-CH_2CH_3$

(2) $CH_3(CH_2)_4 - O - CH_3$

(3) $CH_3CH_2 - CH(CH_3) - O - CH_2CH_3$

(4) $CH_3 - (CH_2)_3 - O - CH_2CH_3$

78. Mono-chlorination of toluene in sunlight followed by hydrolysis with aq. NaOH yields:

(1) o-cresol

(2) m-cresol

(3) 2, 4-dihydroxytoluene

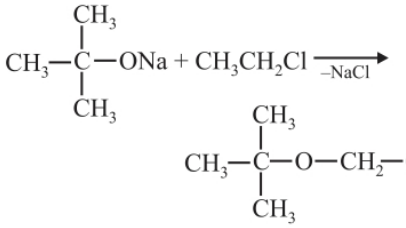
(4) Benzyl alcohol

79. Isopropyl alcohol on oxidation forms:

(1) Acetaldehyde (2) Ethylene

(3) Ether (4) Acetone

80. The reaction



is called:

(1) Williamson continuous esterification process

(2) Etard reaction

(3) Gatterman – Koch reaction

(4) Williamson synthesis

81. Which of the following alcohols is expected to have the lowest pK_a value?

(1) Ethanol

(2) 2-Fluoroethanol

(3) 2,2,2-Trifluoroethanol

(4) 2-Chloroethanol

82. Consider the following reactions:

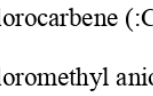
$$\text{Phenol} \xrightarrow{\text{Zn dust}} X \xrightarrow[\text{Anhy.AlCl}_3]{CH_3Cl} Y \xrightarrow{\text{Alk.KMnO}_4} Z$$

The product Z is:

(1) Toluene (2) Benzaldehyde

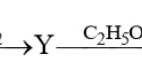
(3) Benzoic acid (4) Benzene

83. The molecule with maximum boiling point is:

(1) 

(2) $CH_3CH_2CH_2CH_2Cl$

(3) 

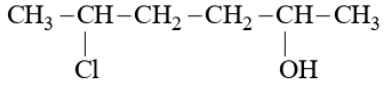
(4) 

84. Phenol on heating with NaOH followed by reaction with alkyl halide gives:

(1) Acetone (2) Ether

(3) Ethanol (4) Acetic acid

85. Give IUPAC name of the compound given below:



(1) 2-chloro-5-hydroxyhexane
(2) 2-hydroxy-5-chlorohexance
(3) 5-chlorohexan-2-ol
(4) 2-chlorohexan-5-ol

SECTION – B

86. Salicylic acid is produced when phenol in alcoholic KOH is treated with
(1) CH_3Cl (2) $CHCl_3$
(3) CH_2Cl_2 (4) CCl_4

87. Consider the following reaction
$C_2H_5I \xrightarrow[X]{\Delta}$ (Pleasant smelling liquid), X is
(1) Sodium
(2) Dry silver oxide
(3) Ethyl chloride
(4) Dry silver powder

88. Cumene $\xrightarrow[(ii)\ H_2O/H^+]{(i)\ O_2}$ (X) and (Y)
(X) and (Y) respectively are
(1) Toluene, propene
(2) Toluene, propylchloride
(3) Phenol, acetone
(4) Phenol, acetaldehyde

89. Benzoquinone is prepared by reaction of phenol with:
(1) $Na_2Cr_2O_7$, H_2SO_4
(2) $KMnO_4$, H_2SO_4
(3) Na_2CrO_4, HCl
(4) K_2MnO_4, H_2SO_4

90. Identify the product Z in the following sequence of reactions

$$\text{phenol} \xrightarrow{NaOH} X \xrightarrow[4-7\ atm,\ 410K]{CO_2} Y \xrightarrow{H_3O^+} Z$$

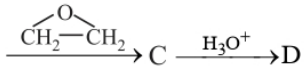
(1) Aspirin (2) Salicyladehyde
(3) Benzoic acid (4) Salicylic acid

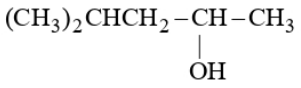
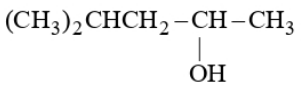
91. Iso-propyl alcohol $\xrightarrow[\Delta]{Al_2O_3}$ B $\xrightarrow[H_2SO_4]{Conc}$ C $\xrightarrow[boil]{water}$ D. In this reaction D is:
(1) Iso-propyl alcohol
(2) Propene
(3) n-butyl alcohol
(4) n-propyl alcohol

92. When $CH_2 = CH - O - CH_2 - CH_3$ reacts with one mole of HI, one of the products formed is:
(1) Ethane
(2) Ethanol
(3) Iodoethene
(4) Ethanal

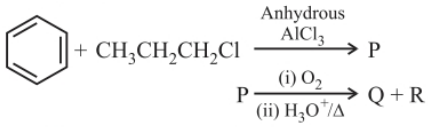
93. An ether on hydrolysis with dil H_2SO_4 gives two products which are successive members of a homologous series. The ethers may be:
(1) Dimethyl ether
(2) Diethyl ether
(3) Methyl propyl ether
(4) Ethyl methyl ether

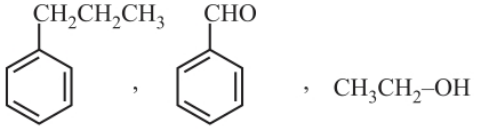
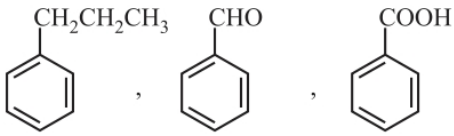
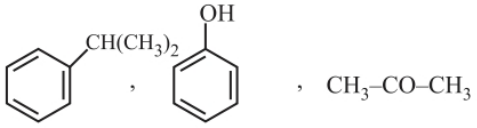
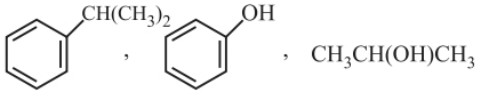
94. $(CH_3)_2CHCH_2OH \xrightarrow{PBr_3} A \xrightarrow{Mg} B$



(1) $(CH_3)_2CHCH_2CH_2CH_2OH$
(2) $(CH_3)_2CHCH_2CH_2OH$
(3) 
(4) 

95. Identify the major products P, Q and R in the following sequence of reactions:



P **Q** **R**
(1) 
(2) 
(3) 
(4) 

96. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?

(1) $CH_3-CH_2-CH_2-CH_2-O-CH_3$

(2) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-O-CH_3$

(3) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-O-CH_3$

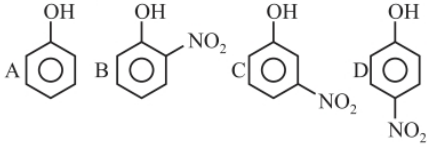
(4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-O-CH_3$

97. $HOCH_2CH_2OH$ on heating with periodic acid gives:

(1) $2CO_2$ (2) $2HCOOH$

(3) $\begin{matrix}CHO\\|\\CHO\end{matrix}$ (4) $\begin{matrix}H\\\diagdown\\C=O\\\diagup\\H\end{matrix}$

98. The descending order of pK_a values of the following compounds is



(1) D > B > C > A (2) A > C > B > D

(3) B > D > C > A (4) A > C > D > B

99. In the following reactions:

I. $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle OH}{\underset{|}{CHCH_3}} \xrightarrow{H^+/Heat} \underset{\text{(Major)}}{A} + \underset{\text{(Minor)}}{B}$

II. $A \xrightarrow[\text{in the absence of peroxide}]{HBr,\ dark} \underset{\text{(Major)}}{C} + \underset{\text{(Minor)}}{D}$

The major product (A) and (C) are respectively

(1) $CH_2=\overset{\displaystyle CH_3}{\overset{|}{C}}-CH_2CH_3$ and $CH_3-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2CH_3$

(2) $CH_2=\overset{\displaystyle CH_3}{\overset{|}{C}}-CH_2-CH_3$ and $CH_3-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2CH_3$

(3) $CH_2=\overset{\displaystyle CH_3}{\overset{|}{C}}-CH_2-CH_3$ and $CH_2-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2CH_3$

(4) $CH_3-\overset{\displaystyle CH_3}{\overset{|}{C}}=CHCH_3$ and $CH_3-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_2-CH_3$

100. In the following reaction, A is

$C_2H_5MgBr + H_2C-\underset{\displaystyle O}{\underset{\diagdown\ \diagup}{CH_2}} \xrightarrow{H_2O} A$

(1) $C_2H_5CH_2CHO$

(2) $C_2H_5CH_2CH_2OH$

(3) $C_2H_5CH_2OH$

(4) $C_2H_5HSO_4$

SECTION-III (BOTANY)

SECTION – A

101. RNA polymerase-I transcribes ……. in eukaryotes.

(1) tRNA (2) rRNA

(3) snRNA (4) hnRNA

102. During transcription, DNA site at which RNA polymerase binds is called–

(1) Promoter (2) Origin

(3) Regulator (4) Enhancer

103. A transcription unit is

(1) Monocistronic in prokaryotes

(2) Polycistronic in eukaryotes

(3) Monocistronic in eukaryotes

(4) Noncistronic

104. If coding strand of DNA contains 5 thymidylic acids and 10 adenylic acids, the number of thymine residue and adenine residue in mRNA will be

(1) 5, 10 (2) 0, 10

(3) 10, 5 (4) 10, 10

105. Transcription involves-

(1) Synthesis of RNA over DNA template where both strand act as template.

(2) Joining of amino acids in a polypeptide.

(3) Synthesis of RNA over ribosome.

(4) Synthesis of RNA over DNA template where one strand act as template.

106. Choose **incorrect** statement

(1) Split gene arrangement in eukaryotes represents an ancient feature of genome.

(2) The presence of introns is reminiscent of antiquity.

(3) Process of splicing represents the dominance of RNA-world.

(4) Splicing represent the dominance of DNA world.

107. In prokaryotes, which process of transcription is catalysed by RNA polymerase only?

(1) Initiation (2) Elongation

(3) Termination (4) Aminoacylation

108. Mark the **correct** statements
(1) hnRNA is more stable than mRNA.
(2) Chargaff proposition is for double stranded DNA.
(3) Double helix model for the structure of DNA was proposed by Watson and Crick.
(4) In double helix DNA, two chains have anti-parallel polarity.
(1) 1, 2, 3 correct (2) 1, 2 correct
(3) 2, 3 and 4 correct (4) 1, 3 correct

109. The coding sequences of DNA are known as _____ and the intervening sequences are known as _____ respectively.
(1) Exon, intron (2) Intron, exon
(3) Cistron, exon (4) Exon, cistron

110. During transcription in eukaryotes mRNA have code similar to
(1) Strand which is 5' to 3'
(2) Template strand
(3) Promoter
(4) Terminator

111. Location of promoter in transcription is–
(1) 5' end of coding strand
(2) 3' end of non-coding strand
(3) Upstream of terminator
(4) Downstream of template strand

112. DNA-dependent RNA polymerase catalyses transcription on one strand of the DNA which is called the
(1) Template strand (2) Coding strand
(3) Alpha strand (4) Anti-strand

113. Similarity between DNA replication and transcription is all **except**–
(1) Direction is 5'-3'
(2) Both require primer
(3) Both occur in nucleus in eukaryotes
(4) Both require DNA as template

114. Which defines the position and presence of template and coding strands in transcription unit?
(1) Promoter (2) Operator
(3) Repressor (4) Inducer

115. Which is the transcriptionally active chromatin?
(1) Euchromatin
(2) Heterochromatin
(3) Tightly packed chromatin
(4) Both (2) and (3)

116. Methyl guanosine triphosphate is added at 5' end of hnRNA in a process of
(1) Tailing
(2) Splicing
(3) Capping
(4) Elongation

117. In a post-transcriptional modification called tailing, _____ residues are added at the _____ of hnRNA.
(1) Adenylate, 5'- end
(2) Guanylate, 3'- end
(3) Adenylate, 3'- end
(4) Guanylate, 5'- end

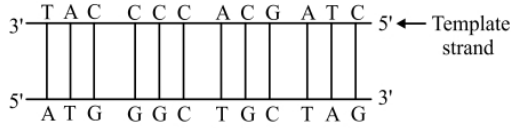
118. In the process of transcription in eukaryotes, the RNA polymerase-III transcribes
(1) tRNA, 5SrRNA and snRNAs
(2) rRNAs-28 S, 18 S and 5.8 S
(3) precursor of mRNA, hnRNA
(4) tRNA, 5.8S rRNA and snRNAs

119. Read the statements and mark them as True (T) or False (F)
A. Rho-factor is required for termination of transcription.
B. Prokaryotic RNA polymerase produces 28 S rRNA.
C. In bacteria, mRNA require processing to become active.
D. In transcription unit, the terminator is located towards 3' -end (downstream) of the coding strand.

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

120. If both the strands copied during transcription, then what will happen?
(1) The segment of DNA would be coding for two different proteins.
(2) Two RNA will be produced simultaneously complementary to each other.
(3) There will be formation of double helical RNA.
(4) All of the above

121. If template strand of DNA with 3' → 5' polarity has the following sequence, find the base sequence in mRNA of *E.coli*?



(1) 5'UAC CCG ACG AUC3'
(2) 3'UAG CGU CGG GUA5'
(3) 5'AUG GGC UGC UAG3'
(4) 5'GAU CGU CGG GUA3'

122. Which non-radioactive isotope was used by Meselson and Stahl in their experiment?
(1) P32 (2) S35
(3) N15 (4) S15

123. The three codons which result in the termination of polypeptide chain synthesis are
(1) UAA UAG GUA
(2) UAA UAG UGA
(3) UAA UGA UUA
(4) UGU UAG UGA

124. Which among the following was the first genetic material?
(1) DNA (2) RNA
(3) Protein (4) Nuclein

125. A DNA strand with the sequence AACGTAACG is transcribed. What is the sequence of the mRNA molecule synthesized?
(1) AACGTAACG
(2) UUGCAUUGC
(3) AACGUAACG
(4) TTGCATTGC

126. Which statement is correct for mature mRNA in eukaryotes?
(1) Exons and introns do not appear in the mature RNA
(2) Exons appear but introns do not appear in the mature RNA
(3) introns appear but exons do not appear in the mature RNA
(4) Both exons and introns appear in the mature RNA

127. What is the main function of tRNA in relation to protein synthesis?
(1) Initiates transcription
(2) Inhibits protein synthesis.
(3) Identifies amino acids and transport them to ribosomes.
(4) proofreading.

128. The transforming principle of *Pneumococcus* as found out by Avery, MacLeod and McCarty was
(1) *m*RNA (2) DNA
(3) Protein (4) Polysaccharide

129. Nucleoside differs from a nucleotide. It lacks the:
(1) Base
(2) Sugar
(3) Phosphate group
(4) Hydroxyl group

130. Anticodon is found:
(1) On DNA (2) On t-RNA
(3) On r-RNA (4) On m-RNA

131. Initiation codon in eukaryotes is
(1) GAU (2) AGU
(3) AUG (4) UAG

132. Which of the following is **not** true for genetic code?
(1) It is unambiguous
(2) A codon in mRNA is read in a noncontiguous fashion
(3) It is nearly universal
(4) It is degenerate

133. Which of the following RNAs should be most abundant in animal cell?
(1) *r*RNA (2) *t*RNA
(3) *m*RNA (4) *hn*RNA

134. Match column I (chemical compounds) with column II (example). Choose the correct asnwer.

Column I (Chemical compounds)		**Column II** (Example)	
A.	Nitrogen base	1.	RNA
B.	Nucleoside	2.	Thymidylic acid
C.	Nucleotide	3.	Cytidine
D.	Nucleic acid	4.	Uracil

Codes:

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

135. Condensation product of adenine, ribose and phosphoric acid is named as
(1) Adenosine
(2) Adenylic acid
(3) Adenine phosphate
(4) Both (2) and (3)

SECTION – B

136. From the following, identify the **correct** combination of salient features of genetic code.
(1) Universal, Non-ambiguous, Overlapping
(2) Degenerate, Overlapping, Commaless
(3) Universal, Ambiguous, Degenerate
(4) Degenerate, Non-overlapping, Non-ambiguous

137. Which of the following *m*RNA can be translated?
(1) AUG UGA UUU
(2) UAA UAV UGG
(3) UAG UGA UUV
(4) UGA UUV UGG

138. Match column I with column II and choose the correct option.

Column I		Column II	
A.	Exon	1.	Site for binding of RNA polymerase
B.	Capping	2.	Coding sequence
C.	Tailing	3.	Lagging strand
D.	Promoter	4.	Methyl guanosine triphosphate
		5.	Adenylate residues

	A	B	C	D
(1)	2	4	5	1
(2)	2	4	1	5
(3)	3	1	2	4
(4)	2	4	3	1

139. **Statement (A):** The primary transcript produced in eukaryotes is translated without undergoing any modification or processing.
Statement (B): The *hn*RNA in humans has exons and introns.
(1) Both the statements A and B are correct.
(2) Both the statements A and B are incorrect.
(3) Statement B is correct but statement A is incorrect.
(4) Statement A is correct but statement B is incorrect.

140. Which of the following statements is not **correct** for protein synthesis?
(1) UAA codon codes for lysine
(2) UGG codon codes for tryptophan
(3) Cysteine is coded by UGU and UGC codons
(4) Tyrosine is coded by UAU and UAC codons

141. In the genetic code dictionary, how many codons are used to code for all the 20 essential amino acids?
(1) 61 (2) 60
(3) 20 (4) 64

142. As most of the amino acids are coded by more than one codon, the genetic code is
(1) overlapping (2) universal
(3) degenerate (4) generate

143. The first phase of translation is
(1) recognition of DNA molecule
(2) aminoacylation of tRNA
(3) recognition of an anti-codon
(4) binding of *m*RNA to ribosome

144. Amino acid sequence, in protein synthesis is decided by the sequence of
(1) tRNA
(2) mRNA
(3) cDNA
(4) rRNA

145. During translation initiation in prokaryotes, a GTP molecule is needed in
(1) association of 30S, *m*RNA with formyl met tRNA
(2) association of 50S subunit of ribosome with initiation complex
(3) formation of formyl met tRNA
(4) binding of 30S subunit of ribosome with *m*RNA

146. Protein synthesis in an animal cell takes place
(1) only in the cytoplasm
(2) in the lysosome as well as in the cytoplasm
(3) in the cytoplasm as well as in mitochondria
(4) only on ribosomes attached to a nucleus

147. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?
(1) Deletion of non-essential genes
(2) Super-coiling in nucleosomes
(3) DNase digestion
(4) Through elimination of repetitive DNA

148. Which of the following is not applicable for RNA?
(1) Complementary base pairing
(2) 5' phosphoryl and 3 hydroxyl ends
(3) Heterocyclic nitrogenous bases
(4) Chargaffs rule

149. Given below are two statements.

Statement I RNA being a catalyst was reactive and hence unstable.

Statement II DNA being double stranded and having complementary strand further resists changes by evolving a process of repair.

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

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

150. Read the following statements and choose the set of correct statements.

I. Euchromatin is loosely packed chromatin.
II. Heterochromatin is transcriptionally active.
III. Histone octamer is wrapped by negatively charged DNA in nucleosome.
IV. Histones are rich in lysine and arginine.
V. A typical nucleosome contains 400 bp of DNA helix.

Choose the correct answer from the options given below.

(1) I, III and IV (2) II and V
(3) I, III and V (4) II, IV and V

SECTION-IV (ZOOLOGY)

SECTION – A

151. The technique of genetic engineering include:

(1) Creation of recombination DNA
(2) Gene clonning
(3) Gene Transfer
(4) All of the above

152. These are three basic steps in genetically modify organism arrange these steps in correct sequence .

A. Introduction of the Identified DNA into the host
B. Maintenance of introduced DNA in the host and transfer of the DNA to its progeny
C. Identification of DNA with desirable genes

(1) A. → B. → C (2) B. → C.→ A.
(3) C. → B. → A. (4) C. → A. → B.

153. In recombinant DNA technology a plasmid vector is cleaved by

(1) Modified DNA ligase
(2) A heated alkaline solution
(3) The same enzyme that cleaves donor DNA
(4) Different enzyme that cleaved the donor DNA

154. What is the correct sequence of steps followed in PCR?

(1) Extension → Annealing → Denaturation
(2) Denaturation → Ligation → Annealing
(3) Denaturation → Extension → Ligation
(4) Denaturation → Annealing → Extension

155. The core techniques of modern biotechnology are

(1) Genetic engineering
(2) Chemical engineering
(3) Mechanical engineering
(4) Both (1) and (2)

156. Plasmid used to construct the first recombinant DNA was isolated from which species of bacteria

(1) *Escherichia coli*
(2) *Salmonella Typhimuurium*
(3) *Agrobactrium tumefaciens*
(4) *Thermus aquaticus*

157. Genetic engineering is possible because

(1) We can cut DNA at specific sites by restriction endonuclease.
(2) Restriction endonucleases purified from viruses can be used in bacteria.
(3) The phenomenon on of transduction in bacteria is well understood.
(4) We can see DNA through electron microscope.

158. Method in which plant cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA known as-

(1) Microinjection
(2) PCR
(3) Biolistics or gene gun
(4) Both (1) and (3)

159. After the formatiom of products in the bioreactors it undergoes through some processes, before a finished product to be ready for marketing is called-

(1) Elution
(2) Upstream processing
(3) Downstream processing
(4) Molecular scissor

160. Which of the following statement is incorrect w.r.t origin of replication (ori)
(1) Ori (Origin of replication) is a sequence from where replication starts.
(2) Ori sequence is also responsible for controlling the copy number of the linked DNA.
(3) Ori is a sequence from where replication starts and any piece of DNA not linked to this sequence.
(4) Both (1) and (3)

161. Identify the palindromic sequence from the following sequence given below.
(1) $\frac{^{5'}GAATTC^{3'}}{^{3'}CTTUUG^{5'}}$ (2) $\frac{^{5'}GGATCC^{3'}}{^{3'}CCTAGG^{5'}}$
(3) $\frac{^{5'}CCTGG^{3'}}{^{3'}GGACC^{5'}}$ (4) $\frac{^{5'}CGATA^{3'}}{^{3'}GCTAA^{5'}}$

162. The term Molecular scissors refers to -
(1) Polymerases
(2) Restriction Endonucleases
(3) Ribonucleases
(4) Cellulases

163. Read the given statement and select the correct option
Statement I: Both bacteria and yeast multiply very rapidly to form huge population that express the desired genes.
Statement II: In recombinant DNA technology human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryotes)
(1) Both statements 1 and II are correct
(2) Statement I is correct but statement II is incorrect.
(3) Statement I is incorrect.
(4) Both statement I and II are incorrect

164. Which of the following characteristics is generally not preferred for a cloning vector?
(1) An origin of replication
(2) An antibiotic resistance gene
(3) Multiple restriction sites
(4) A high copy number

165. _____ is a procedure through which a piece of DNA is introduced in a host bacterium.
(1) Replication
(2) Transformation
(3) Gel electrophoresis
(4) Polymerase chain Reaction

166. While isolating DNA from bacteria which of the following enzyme is not used?
(1) Lysozyme
(2) Ribonuclease
(3) Protease
(4) DNase

167. Which of the following statement does not hold true for restriction enzyme.
(1) It recognises a palindromic nucleotide sequence
(2) It is an endonuclease .
(3) It is isolated from bacteriophages.
(4) It produces the same kind of sticky ends in different DNA molecules.

168. Which vector is commonly used in the transfer of gene in a crop plant?
(1) Retrovirus.
(2) Bacteriophages.
(3) Ti plasmids of *Agrobacterium*.
(4) E coli

169. Which of the following is a plasmid vector?
(1) PBR^{322}
(2) Bam II
(3) Sal I
(4) ECoR I

170. How many copies of DNA sample are produced in PCR technique after 6-cycle.
(1) 4 (2) 32
(3) 64 (4) 16

171. Select the mismatch option w.r.t enzyme and its target component
(1) Lysozyme Bacterial cell
(2) Chitinase Algal cell
(3) Cellulase Plant Cell
(4) Ribonuclease RNA

172. A suitable vectors for gene cloning in higher organism is:
(1) Baculovirus
(2) Retrovirus
(3) *Salmonella typhimurium*
(4) *Neurospora*

173. In Gel electrophoresis at which end of the gel the sample is loaded?
(1) In the wells
(2) Towards positive electrode
(3) Towards negative electrode
(4) Both (1) and (3)

174. An antibiotic resistance gene of plasmid vector which get inactivated due to insertion of alien DNA helps in the selection of:
(1) Transformants
(2) Recombinants
(3) Non Transformants
(4) Both (2) and (3)

175. In which type of bioreactor air bubbles dramatically increases the oxygen transfer area?
(1) Simple stirred tank bioreactor
(2) Sparged stirred tank bioreactor
(3) Gene gun
(4) Both (1) and (2)

176. First Recombinant DNA was made by
(1) Herbert Cohen and Stanley Boyer 1996
(2) Stanley Cohen and Herbert Boyer 1991
(3) Stanley Cohen and Herbert Boyer1972
(4) Herber Cohen and Stanley Boyer 1992

177. Technique used for separation of DNA fragments are
(1) Gel electrophoresis
(2) DNA fingerprinting
(3) PCR
(4) DNA cloning

178. DNA fragments are
(1) Negatively charged
(2) Positively charged
(3) Neutral
(4) Both (1) and (2)

179. **Assertion (A):** During transformation in order to force bacteria to take up the plasmid the bacterial cell must first be made competent to take up DNA
Reasons (R): This is done by treating them with a specific concentration of monovalent cation such as sodium.
(1) Both (A) and (R) are true and (R) is the correct explanation of the (A)
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(3) If (A) is true but (R) is false
(4) If both (A) and (R) are false

180. A typical bioreactor has
A. An agitator system
B. An oxygen delivery system
C. A Foam control system
D. A temperature control system
E. A pH control system
F. Sampling ports
(1) A, B and C
(2) A, B, C and D
(3) A, B, C and D
(4) A, B, C, D, E and F

181. Match the following columns.

Column I		Column II	
A.	Plasmid	P.	Virus infecting Bacteria
B.	Bacteriophages	Q.	Natural polymer of D-galactose
C.	Selectable Marker	R.	Identification of Recombinants
D.	Agarose	S.	Circular extrachromosomal DNA

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

182. Stained DNA is exposed to-
(1) Visible light (2) UV light
(3) IR light (4) Tube light

183. Colour of DNA visible under UV light after Ethidium Bromide.
(1) Blue (2) Black
(3) Orange (4) Green

184. EFB stands for
(1) English Federation of Biology
(2) European Federation of Biology
(3) English Federation of Biotechnology
(4) European Federation of Biotechnology

185. ECoRI comes from-
(1) Genus *Eichhoni*a
(2) Species *Coli*
(3) Genus *Echhinus*
(4) Both (1) and (3)

SECTION – B

186. Select the incorrect statement .
(1) Foreign DNA can be ligated at the Bam H-I site of ampiclillin resistance gene in the vector PBR^{322}.
(2) Some plasmids may have only one or 2 copies per cell whereas others may have 15-100 copies per cell.
(3) In almost all recombinant technologies the ultimate aim is to produce a desirable protein.
(4) All of the above.

187. **Assertion (A):** Beside Hind II today we know more than 900 restriction enzymes that have been isolate form over 230 strains of bacteria.
Reason(R): Each Restriction enzyme recognize different recognition sequence.
(1) If both (A) and (R) are true and (R) is the correct explanation of (A).
(2) If both (A) and (R) are true and (R) is not the correct explanation of (A)
(3) If (A) is true but (R) is false
(4) If both (A) and (R) are false

188. Heat shock is:
(1) Give at 42°C
(2) A step of process that enable linking of alien DNA to the plasmid
(3) A step of the process that enables introduction of align DNA into the host cell
(4) Both (1) and (3)

189. Select the correct statement .
(1) Agarose gel electrophoresis is used to check the progression of a restriction enzyme digestion.
(2) DNA fragment separate according to their shape .
(3) The separated bonds of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution.
(4) Both (1) and (3)

190. In restriction enzymes like ECoRI the Roman numbers following the names indicate the
(1) Order in which the enzyme were discovered from the strain of bacteria.
(2) Order in which the enzyme were isolated from that strain of bacteria.
(3) Genus of the prokaryotic cell or bacteria.
(4) Strain of the bacteria.

191. In the year **a** the two enzyme responsible for **b** the growth of bacteriophage in E coli were isolated_____
(1) a - 1967, b - promoting
(2) a - 1963, b - restricting
(3) a - 1982, b- restricting
(4) a - 1963, b -methyl

192. Gene of interest was cloned at site Sal I in PBR^{322}. The recombinant plasmid will exhibit susceptibility to
(1) Tetracyclin only
(2) Tetracyclin and Ampicillin.
(3) Amplicillin only.
(4) Broad spectrum of antibiotic.

193. PCR stands for
(1) Polymerase chain Reaction
(2) Polypeptide chain Reaction
(3) Polynuclease chain Reaction
(4) All of the above.

194. How many sets of primers are used in PCR.
(1) 1 (2) 2
(3) 3 (4) 4

195. The precipitated DNA is seen as -
(1) Collection of fine threads in suspension.
(2) Collection of fine threads in solution.
(3) Coagulated mass in suspension.
(4) Coagulated mass in solution.

196. Biotechnology uses techniques to alter chemistry of-
(1) Protein and Lipid
(2) Protein and RNA
(3) Lipid and DNA
(4) RNA and DNA

197. Which of the following tools of recombinant DNA technology is incorrectly match with its use
(1) Restriction enzyme - Production of RFLPs
(2) DNA ligase - That cuts DNA creating the sticky ends
(3) DNA polymerase - Used in polymerase chain reaction to amplify DNAs Segment
(4) Reverse transcriptase - Production of cDNA from mRNA

198. The method in which alien DNA is directly injected into the nucleus of an animal cell is known as-
(1) Biolistic
(2) Micro injection
(3) Electroporation
(4) Heat shock treatment

199. The DNA polymerase (Taq polymerase) used in polymerase chain reaction (PCR) has been isolated from-

(1) Bacteria
(2) Plant
(3) Nematode
(4) Fungus

200. Which are the tools of recombinant DNA technology-

(1) Cloning vectors
(2) Restriction endonuclease
(3) Restriction exonuclease
(4) All of the above

NEET (2024)

PRACTICE TEST-05 SOLUTION

DURATION : 200 Minutes | **M. MARKS : 720**

ANSWER KEY

PHYSICS		CHEMISTRY		BOTANY		ZOOLOGY	
1.	(3)	51.	(4)	101.	(2)	151.	(4)
2.	(3)	52.	(1)	102.	(1)	152.	(4)
3.	(3)	53.	(1)	103.	(3)	153.	(3)
4.	(1)	54.	(4)	104.	(2)	154.	(4)
5.	(1)	55.	(4)	105.	(4)	155.	(4)
6.	(2)	56.	(4)	106.	(4)	156.	(2)
7.	(2)	57.	(4)	107.	(2)	157.	(1)
8.	(3)	58.	(3)	108.	(3)	158.	(3)
9.	(3)	59.	(3)	109.	(1)	159.	(3)
10.	(3)	60.	(3)	110.	(1)	160.	(3)
11.	(2)	61.	(1)	111.	(2)	161.	(2)
12.	(3)	62.	(4)	112.	(1)	162.	(2)
13.	(3)	63.	(1)	113.	(2)	163.	(1)
14.	(3)	64.	(2)	114.	(1)	164.	(3)
15.	(1)	65.	(2)	115.	(1)	165.	(2)
16.	(2)	66.	(2)	116.	(3)	166.	(4)
17.	(1)	67.	(1)	117.	(3)	167.	(3)
18.	(3)	68.	(1)	118.	(1)	168.	(3)
19.	(1)	69.	(3)	119.	(1)	169.	(1)
20.	(3)	70.	(3)	120.	(4)	170.	(3)
21.	(4)	71.	(1)	121.	(3)	171.	(2)
22.	(1)	72.	(3)	122.	(3)	172.	(2)
23.	(1)	73.	(4)	123.	(2)	173.	(4)
24.	(1)	74.	(4)	124.	(2)	174.	(2)
25.	(3)	75.	(4)	125.	(2)	175.	(2)
26.	(1)	76.	(3)	126.	(2)	176.	(3)
27.	(1)	77.	(4)	127.	(3)	177.	(1)
28.	(1)	78.	(4)	128.	(2)	178.	(1)
29.	(2)	79.	(4)	129.	(3)	179.	(3)
30.	(2)	80.	(4)	130.	(2)	180.	(4)
31.	(3)	81.	(3)	131.	(3)	181.	(1)
32.	(2)	82.	(3)	132.	(2)	182.	(2)
33.	(1)	83.	(3)	133.	(1)	183.	(3)
34.	(2)	84.	(2)	134.	(3)	184.	(4)
35.	(1)	85.	(3)	135.	(2)	185.	(2)
36.	(1)	86.	(4)	136.	(4)	186.	(1)
37.	(4)	87.	(2)	137.	(1)	187.	(2)
38.	(3)	88.	(3)	138.	(1)	188.	(4)
39.	(2)	89.	(1)	139.	(3)	189.	(4)
40.	(3)	90.	(4)	140.	(1)	190.	(2)
41.	(1)	91.	(1)	141.	(1)	191.	(2)
42.	(1)	92.	(4)	142.	(3)	192.	(1)
43.	(1)	93.	(4)	143.	(2)	193.	(1)
44.	(3)	94.	(1)	144.	(2)	194.	(2)
45.	(4)	95.	(3)	145.	(1)	195.	(1)
46.	(2)	96.	(3)	146.	(3)	196.	(4)
47.	(4)	97.	(4)	147.	(2)	197.	(2)
48.	(4)	98.	(2)	148.	(4)	198.	(2)
49.	(1)	99.	(4)	149.	(4)	199.	(1)
50.	(1)	100.	(2)	150.	(1)	200.	(4)

SECTION – I (PHYSICS)

1. **(3)**

Emf is independent of resistivity of wire of the coil.

[NCERT; Page. No-207, 6.4]

2. **(3)**

[NCERT; Page. No- 206, 6.3]

3. **(3)**

[NCERT; Page. No- 206, 6.3]

4. **(1)**

As the ring has a cut in it so it will get induced emf when flux change due to motion of the magnet but there will not be any induced current because circuit is incomplete due to cut, so there will be no extra field due ring so no effect on motion of magnet so its acceleration will be constant as g.

[NCERT; Page. No-205. 6.2]

5. **(1)**

When a magnet is moved towards the coil quickly, rate of change of flux is larger than that if the magnetic is moved slowly, thus larger emf is induced due to quick movement of the coil.

[NCERT; Page. No-207, 6.4]

6. **(2)**

$$\text{Mutual inductance} = \frac{\phi}{I} = \frac{BA}{I}$$

$$[\text{Henry}] = \frac{\left[MT^{-1}Q^{-1}L^2\right]}{\left[QT^{-1}\right]} = ML^2Q^{-2}$$

[NCERT; Page. No-220, 6.9.1]

7. **(2)**

It is also possible the emf is induced in a single isolated coil due to change of flux through the coil by means of varying the current through the same coil. This phenomenon is called self–induction. In this case, flux linkage through

a coil of N turns is proportional to the current through the coil and is expressed as $N\phi_B \propto I \Rightarrow N\phi_B \propto LI$ ....(i) where, constant of proportionality L is called self–inductance of the coil. It is also called the coefficient of self–inductance of the coil. When the current is varied, the flux linked with the coil also changes and an emf is induced in the coil. Using equation (i) the induced emf is given by

$$\varepsilon = -\frac{d\left(N\phi_B\right)}{dt} \Rightarrow \varepsilon = -L\frac{dI}{dt}$$

Thus, the self–induced emf always opposes any change (increase or decrease) of current in the coil.

[NCERT; Page. No-219, 6.9]

8. **(3)**

$$\text{EMF} = -\frac{d\phi}{dt} = -\frac{dB\pi r^2}{dt} = -\pi r^2\frac{dB}{dt}$$

$$E = \left(\frac{EMF}{r}\right) = \left(\frac{\pi dB}{dt}\right)r$$

$E \propto$ r for $r \le R$

$E \propto 1/r$ for $r > R$.

[NCERT; Page. No-219, 6.9]

9. **(3)**

[NCERT; Page. No-219., 6.9]

10. **(3)**

Using Lenz's law, Fleming right hand law.

[NCERT; Page. No-205, 6.4]

11. **(2)**

Two pure inductors each of self–inductance L are connected in series, the net inductance **<u>2L.</u>**

[NCERT; Page. No-219, 6.9]

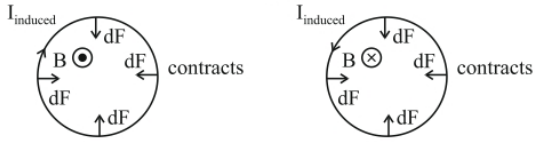
12. **(3)**

A magnetic field is induced in the space between the inductor. And this magnetic field corresponds to energy.

[NCERT; Page. No- 207, 6.4]

13. **(3)**

As soon as the field changes, there will be an induced current in the ring



[NCERT; Page. No-212, 6.6]

14. **(3)**

[NCERT; Page. No-218, 6.8]

15. **(1)**

$$\varepsilon = -\frac{d\phi}{dt} = -B\frac{dA}{dT}$$

$$A = 2r^2\cos^{-1}\frac{x}{2r} - \frac{x}{2}\sqrt{4R^2 - x^2}$$

$x = vt$

$x = 6m$, $v = 2m/s$, $R = 5\ m$, $B = 0.5$ T

Solve to get $\varepsilon = 8$V

[NCERT; Page. No-219, 6.9]

16. (2)

The charge through the coil = area of current–time ($i - t$) graph

$q = \frac{1}{2} \times 0.1 \times 4 = 0.2\,C$

$q = \frac{\Delta\phi}{R} \because$ Change in flux $(\Delta\phi) = q \times R$

$q = 0.2 = \frac{\Delta\phi}{10}$

$\Delta\phi = 2$ weber

[NCERT; Page. No-206, 6.3]

17. (1)

The relative position and the orientation of the two coils.

[NCERT; Page. No-220, 6.9.1]

18. (3)

[NCERT; Page. No-224, 6.10]

19. (1)

The emf is given by

$e = \frac{Bl^2\omega}{2} = \frac{0.5 \times 1^2 \times 400}{2} = 100\text{V}$

[NCERT; Page. No-222, 6.9.2]

20. (3)

Electromagnetic induction was discovered by Michael Faraday in 1831.

[NCERT; Page. No-219, 6.9]

21. (4)

Lenz's law (that the direction of induced emf is always such as to oppose the change that cause it) is direct consequence of the law of conservation of energy.

[NCERT; Page. No-210, 6.5]

22. (1)

[NCERT; Page. No-219, 6.9]

23. (1)

[NCERT; Page. No-219, 6.9]

24. (1)

[NCERT; Page. No-222, 6.9.2]

25. (3)

$\varepsilon = \left(5 \times 10^{-3}\right)(1/0.1) = 0.05V.$

[NCERT; Page. No-212, 6.6]

26. (1)

According, to Faraday's law of induction

Induced e.m.f. $\varepsilon = -\frac{d\phi}{dt} = -(100t)$

Induced current i at $t = 2$ sec

$= \left|\frac{\varepsilon}{R}\right| = +\frac{100 \times 2}{400} = +0.5$ Amp

[NCERT; Page. No-206, 6.3]

27. (1)

Induced e.m.f. $\varepsilon = \frac{d\phi}{dt} = \frac{dBA}{dt} = A_0\frac{dB}{dt}$

$= A_0\left(\frac{4B_0 - B_0}{t}\right) = 3A_0B_0/t$

[NCERT; Page. No-212, 6.6]

28. (1)

$I_1 = 0, I_2 = \frac{\varepsilon}{R}, I_3 = \frac{\varepsilon}{2R}$

$\Rightarrow I_2 > I_3 > I_1$

[NCERT; Page. No-222, 6.9.2]

29. (2)

$\phi = 10t^2 - 50t + 250$

$e = -\frac{d\phi}{dt} = -(20t - 50)$

$e_{t=3} = -10$ V

[NCERT; Page. No-206, 6.3]

30. (2)

$dE = B\omega x dx$

$E = \int_0^L B\omega x dx$

$= B\omega\frac{x^2}{2}$

$= \frac{1}{2}B\omega l^2$

[NCERT; Page. No-212, 6.6]

31. (3)

$\frac{\Delta\phi}{\Delta t} = \varepsilon = iR \Rightarrow \Delta\phi = (i\Delta t)R = QR \Rightarrow Q = \frac{\Delta\phi}{R}$

[NCERT; Page. No-206, 6.3]

32. (2)

[NCERT; Page. No-219, 6.9]

33. (1)

Here $\upsilon = 0.5$Hz, $N = 200$, $A = 0.1\,m^2$ and $B = 0.02\ T$

Maximum voltage generated is

$\varepsilon_0 = NBA(2\pi\upsilon)$

$= 200 \times 0.02 \times 0.1 \times (2\pi \times 0.5) = 1.26V$

[NCERT; Page. No-224, 6.10]

34. (2)

Magnetic flux linked with the loop is $\phi = B\pi r^2$

$$|e| = \frac{d\phi}{dt} = B\pi \cdot 2r\frac{dr}{dt}$$

When $r = 2\text{cm}, \frac{dr}{dt} = 1\ \text{mms}^{-1}$

$$e = 0.025 \times \pi \times 2 \times 2 \times 10^{-2} \times 10^{-3}$$

$$= 0.100 \times \pi \times 10^{-5} = \pi \times 10^{-6} V = \pi\mu V$$

[NCERT; Page. No-206, 6.3]

35. (1)

$$e = \frac{-n(\phi_2 - \phi_1)}{t}$$

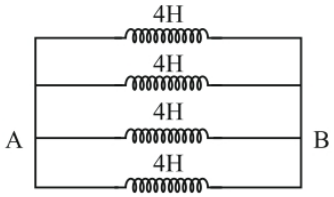
$$= \frac{-50\left(1 \times 10^{-6} - 31 \times 10^{-6}\right)}{0.02}$$

$$= 7.5 \times 10^{-2} V$$

[NCERT; Page. No-212, 6.6]

36. (1)

The equivalent circuit diagram is as shown in the figure.



Here, all the inductances are connected in parallel.

Hence, the equivalent inductance between A and B is

$$\frac{1}{L_{AB}} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1$$

or $L_{AB} = 1$ H

[NCERT; Page. No-219, 6.9]

37. (4)

$\phi = Mi$

$$\frac{d\phi}{dt} = \frac{Mdi}{dt}$$

$\varepsilon = 5 \times 10^{-3}$ (50) (500) cos 500t

$\varepsilon_{max} = 125$ V

[NCERT; Page. No-212, 6.6]

38. (3)

Energy stored U is given by

$$U = \frac{1}{2}Li^2 = \frac{1}{2} \times \left(100 \times 10^{-3}\right)(1)^2 = 0.05J.$$

[NCERT; Page. No-215, 6.7]

39. (2)

From $L = \frac{\mu_0 N^2 A}{1} \alpha \frac{N^2}{1}$

we get, $\frac{L_1}{L_2} = \frac{(1/2)^2}{1/2} = \frac{1}{2}$

[NCERT; Page. No-222, 6.9.2]

40. (3)

e.m.f. induced $= \frac{1}{2}BR^2\omega = \frac{1}{2}BR^2(2\pi n)$

$$= \frac{1}{2} \times (0.1) \times (0.1)^2 \times 2\pi \times 10 = (0.1)^2\ \pi \text{ volts}$$

[NCERT; Page. No-212, 6.6]

41. (1)

By using $|e_2| = M\frac{di_1}{dt}$

$$i_2 = \frac{e_2}{R_2} = \frac{M}{R_2}\frac{di_1}{dt}$$

$$0.4 = \frac{0.5}{5} \times \frac{di_1}{dt}; \frac{di_1}{dt} = 4 \text{ A/sec}$$

[NCERT; Page. No-220, 6.9.1]

42. (1)

The mutual inductance between two coils depends on their degree of flux linkage, i.e., the fraction of flux linked with one coil which is also linked to the other coil. Here, the two coils in arrangement (1) are placed with their planes parallel. This will allow maximum flux linkage.

[NCERT; Page. No-220, 6.9.1]

43. (1)

Both are True $L \propto N^2$

[NCERT; Page. No- 222, 6.9.2]

44. (3)

As I increases, ϕ increases

$\therefore$ I_i is such that it opposes the increases in ϕ.

Hence, ϕ decreases (By Right Hand Rule). The induced current will be counterclockwise.

[NCERT; Page. No-219, 6.9]

45. (4)

The given circuit clearly shows that the inductors are in parallel we have, $\frac{1}{L} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$ or $L = 1H$

[NCERT; Page. No-219, 6.9]

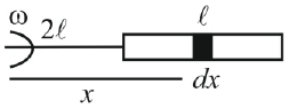
46. (2)

In case of growth of current in a L-R circuit, the current in the circuit grows exponentially with time 0 to the maximum value at, $i_0 = E/R$.

[NCERT; Page. No-210, 6.5]

47. (4)

Here, induced e.m.f.



$$e = \int_{2\ell}^{3\ell} (\omega x) B dx$$

$$= B\omega \frac{[(3\ell)^2] - (2\ell)^2}{2} = \frac{5B\ell^2\omega}{2}$$

[NCERT; Page. No-219, 6.9]

48. (4)

We know that, $M = -\frac{e_2}{di_1/dt} = -\frac{e_1}{di_2/dt}$

Also, $e_1 = -L_1 \frac{di_1}{dt}$ and $e_2 = -L_2 \frac{di_2}{dt}$

$$\Rightarrow M^2 = \frac{e_1 e_2}{\left(\frac{di_1}{dt}\right)\left(\frac{di_2}{dt}\right)} = L_1 L_2$$

$$\Rightarrow M = \sqrt{L_1 L_2}$$

[NCERT; Page. No-222, 6.9.2]

49. (1)

$$E = \frac{d}{dt}(NMI) \Rightarrow E = NM\frac{dI}{dt} \Rightarrow E = \frac{NMI}{t}$$

emf induced per unit turn = $\frac{E}{N} = \frac{MI}{t}$

[NCERT; Page. No-220, 6.9.1]

50. (1)

$R = v/I$

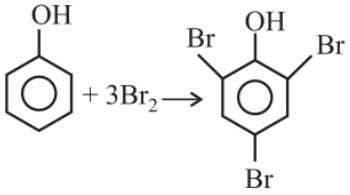
$\tau = L/R = 1$ ms.

[NCERT; Page. No-210, 6.5]

SECTION – II (CHEMISTRY)

51. (4)

NCERT XII, Part-II, Page 342



52. (1)

NCERT XII, Part-II, Page 337

In p-nitrophenol, $-NO_2$ group enhance the acidity of phenol.

53. (1)

NCERT XII, Part-II, Page 347

In ethers, H-bond is absent.

54. (4)

NCERT XII, Part-II, Page 345, 346

$C_2H_5–O–C_2H_5 \xrightarrow{(O)} C_2H_5–O–O–C_2H_5$

55. (4)

NCERT XII, Part-II, Page 335

Proton (H^+) is released from alcohols when it is treated with active metals such as Na, K, and Al. Therefore, alcohols are acidic in nature.

56. (4)

NCERT XII, Part-II, Page 335

$$CH_3CH_2OH \xrightarrow[170°C]{Conc.H_2SO_4} H_2C = CH_2$$

$$2CH_3CH_2OH \xrightarrow[140°C]{Conc.H_2SO_4} CH_3CH_2 - O - CH_2CH_3$$

57. (4)

NCERT XII, Part-II, Page 336

Acidity $\propto \frac{-I, -R}{+I, +R, +H}$

$\therefore$ Correct order of acidity is IV > III > I > II

58. (3)

NCERT XII, Part-II, Page 338

Reactivity of alcohols towards Lucas reagent: 3° > 2° > 1°

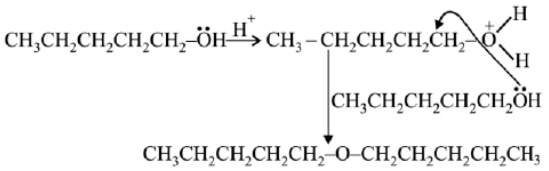
59. (3)

Phenol is also known as carbolic acid.

60. (3)

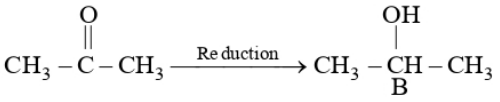
NCERT XII, Part-II, Page 345

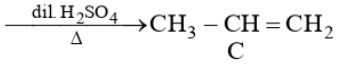
Primary alcohol readily form ether when heated with conc. H_2SO_4



61. (1)

NCERT XII, Part-II, Page 330, 339





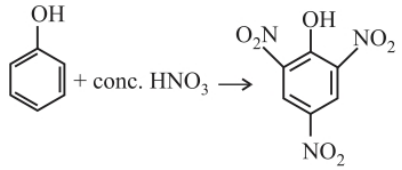
62. (4)

NCERT XII, Part-II, Page 343

It is Reimer Tiemann reaction

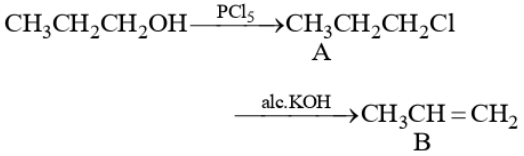
63. (1)

NCERT XII, Part-II, Page 341



64. (2)

NCERT XII, Part-II, Page 338



65. (2)

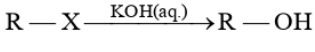
NCERT XII, Part-II, Page 325

Ethers are anhydrides of alcohols, they can be obtained by elimination of a water molecule from two alcohol molecules.

$R– OH + HO – R^1 \rightarrow R – O – R^1 + H_2O$

In simple ether, R and R^1 are same. eg: CH_3OCH_3, $C_2H_5OC_2H_5$ etc. While in mixed ether R and R^1 are different. eg; $CH_3OC_2H_5$.

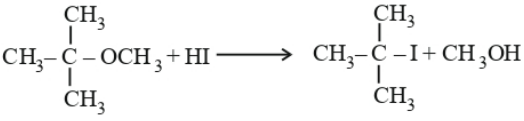
66. (2)



67. (1)

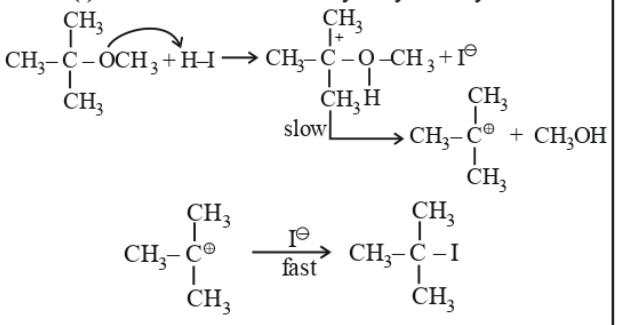
NCERT XII, Part-II, Page 347, 348

When one of the alkyl group is tertiary group, the halide formed is tertiary halide.



Mechanism:

(i) Protonation of tertiary butyl methyl ether →



68. (1)

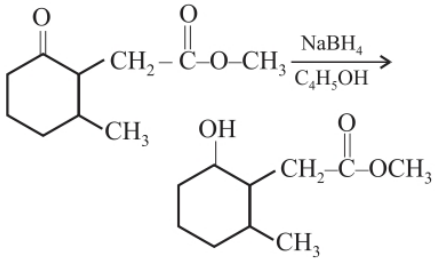
NCERT XII, Part-II, Page 333

Alcohols with same molecular weight are expected to have almost same boiling point however two more factors other than molecular weight are important, they are mainly H-bonding and surface area of molecule. Both these factors are least in

3° alcohols and maximum in 1° alcohols. Hence, 3° alcohols have least boiling point while 1° alcohols have maximum boliling point.

69. (3)

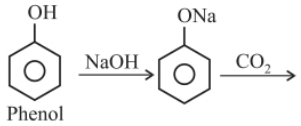
NCERT XII, Part-II, Page 330



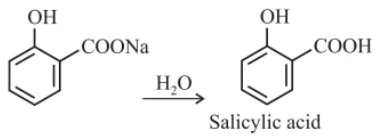
$NaBH_4$ reduces aldehyde/ketone but does not reduce ester.

70. (3)

NCERT XII, Part-II, Page 343



Phenol

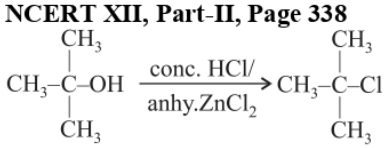


Salicylic acid

The reaction is Kolbe's reaction.

71. (1)

NCERT XII, Part-II, Page 338



72. (3)

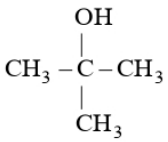
NCERT XII, Part-II, Page 342

4-bromophenol as major product and
2-bromophenol is formed as minor product.

73. (4)

NCERT XII, Part-II, Page 338

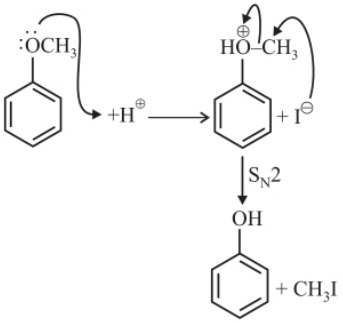
Lucas reagent reacts fastest with tertiary alcohol.
Lucas reagent: Solution of anhy. $ZnCl_2$ and conc. HCl



74. (4)

NCERT XII, Part-II, Page 347

Anisole on cleavage with HI gives phenol and methyl iodide



75. (4)

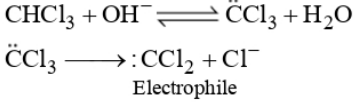
NCERT XII, Part-II, Page 337

Acidic strength of phenol is enhanced by the presence of electron- withdrawing groups which stabilized the phenoxide ion.
While presence of electron- donating group like CH_3,C_2H_5 destabilizes the phenoxide ion, thus decreasing the acidic strength
Due to the presence of strong electron-withdrawing group $-NO_2$ (–I, –R), p-nitro phenol is the strongest acid.

76. (3)

NCERT XII, Part-II, Page 343

It is Reimer-Tiemann reaction. The electrophile formed is $:CCl_2$ (Dichlorocarbene) according to the following reaction



77. (4)

NCERT XII, Part-II, Page 345

In anti Markonikov reaction (presence of peroxide linkage):

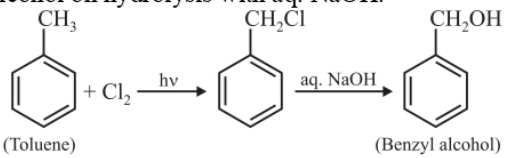
$CH_3CH_2CH = CH_2 + HBr/H_2O_2 \rightarrow$
$CH_3CH_2 - CH_2-CH_2Br$

For ether formation (Williamson synthesis):

$CH_3CH_2CH_2CH_2Br + C_2H_5ONa \rightarrow$
$CH_3CH_2-CH_2-CH_2-O-C_2H_5 + NaBr$

78. (4)

Mono-chlorination of toluene in sunlight gives benzyl chloride. Benzyl chloride shows nucleophilic substitution reaction to give benzyl alcohol on hydrolysis with aq. NaOH.



79. (4)

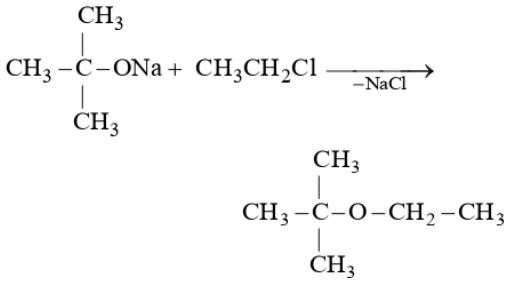
NCERT XII, Part-II, Page 340

Secondary alcohol on oxidation gives Ketone.

80. (4)

NCERT XII, Part-II, Page 346

The above reaction is called Williamson synthesis of ether.



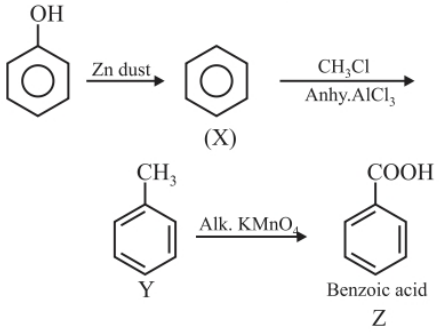
81. (3)

NCERT XII, Part-II, Page 335, 336

2,2,2-Trifluoroethanol is most acidic due to maximum number of electron withdrawing groups.

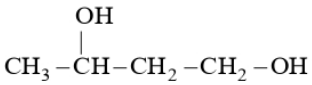
82. (3)

NCERT XII, Part-II, Page 343



83. (3)

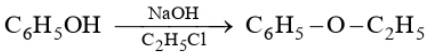
NCERT XII, Part-II, Page 333



have higher boiling point, as it form maximum hydrogen bonds.

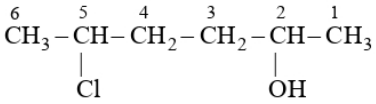
84. (2)

NCERT XII, Part-II, Page 346



85. (3)

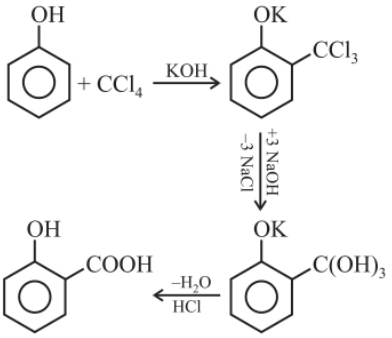
NCERT XII, Part-II, Page 326



The correct IUPAC name of the compound is 5-chlorohexan-2-ol.

86. (4)

NCERT XII, Part-II, Page 343

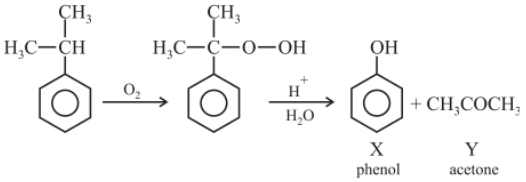


87. (2)

Dry silver oxide.

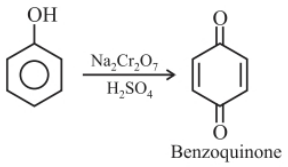
88. (3)

NCERT XII, Part-II, Page 332



89. (1)

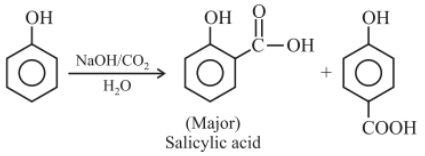
NCERT XII, Part-II, Page 343



90. (4)

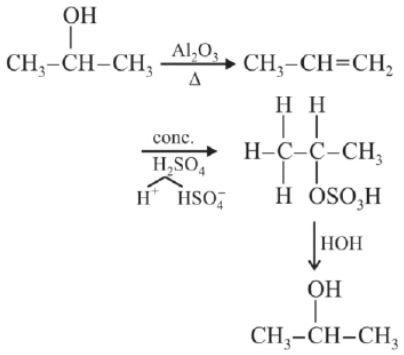
NCERT XII, Part-II, Page 342, 343

Kolbe's reaction:



91. (1)

NCERT XII, Part-II, Page 329



92. (4)

NCERT XII, Part-II, Page 347

Vinyl ethyl ether on reaction with HI produces ethanal and ethyl iodide by means of nucleophilic substitution reaction as shown

$CH_2 = CH–O–CH_2–CH_3 + H–I \rightarrow$

$CH_3CH_2I + CH_3CHO$

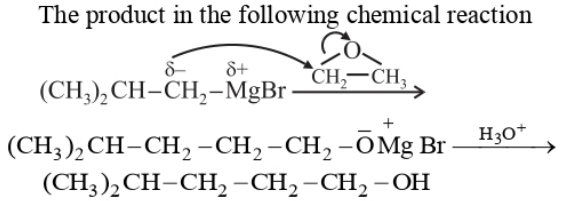
93. (4)

The hydrolysis gives alcohols which are successive members of a homologous series, hence the alkyl radicals in these two alcohols must differ by one $–CH_2–$ group i.e, $CH_3–$ and $CH_3CH_2–$.

94. (1)

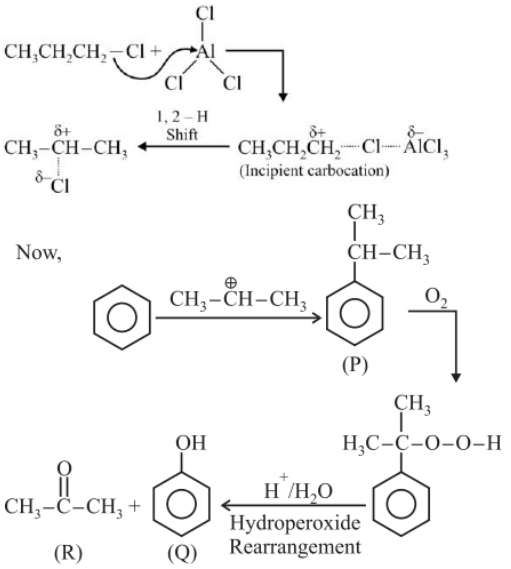
NCERT XII, Part-II, Page 331

The product in the following chemical reaction



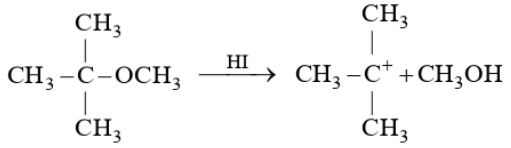
95. (3)

NCERT XII, Part-II, Page 332



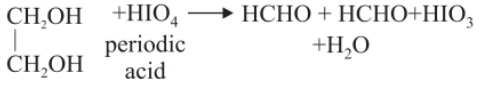
96. (3)

NCERT XII, Part-II, Page 345, 346



As 3° carbocation formed is stabilized because of 9 hyperconjugated H's and 3 inductive effect including $-CH_3$.

97. (4)



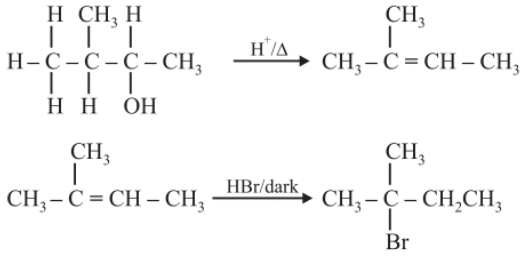
98. (2)

NCERT XII, Part-II, Page 336, 337

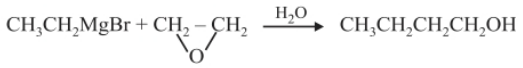
Presence of electron withdrawing group at o– and p–positions makes the compound more acidic.

99. (4)

NCERT XII, Part-II, Page 339



100. (2)



SECTION – III (BOTANY)

101. (2)

RNA polymerase – I transcribes rRNA in eukaryotes.

NCERT Class 12th Pg. No.94 - 95

102. (1)

During transcription, DNA site at which RNA polymerase binds is called promoter.

NCERT Class 12th Pg. No.92

103. (3)

A transcription unit is monocistronic in eukaryotes

NCERT Class 12th Pg. No.92 - 93

104. (2)

RNA contains uracil in place of thymine

NCERT Class 12th Pg. No.91-92

105. (4)

Synthesis of RNA over DNA template where one strand act as template called as transcription.

NCERT Class 12th Pg. No.91

106. (4)

Process of splicing represents the dominance of RNA-world

NCERT Class 12th Pg. No.93-95

107. (2)

The RNA polymerase is only capable of catalysing the process of elongation.

NCERT Class 12th Pg. No.92

108. (3)

mRNA is more stable than hnRNA

NCERT Class 12th Pg. No.95, 81, 88

109. (1)

In eukaryotes, the monocistronic structural genes have interrupted coding sequences – the genes in eukaryotes are split. The coding sequences or expressed sequences are defined as exons. Exons are said to be those sequence that appear in mature or processed RNA. The exons are interrupted by introns.

NCERT Class 12th Pg. No.93

110. (1)
During transcription in eukaryotes mRNA have code similar to strand which is $5' \rightarrow 3'$
NCERT Class 12th Pg. No.92

111. (2)
Location of promoter in transcription is 3' end of non-coding strand.
NCERT Class 12th Pg. No.92

112. (1)
DNA-dependent RNA polymerase also catalyse the polymerisation in only one direction, that is, 5'→3', the strand that has the polarity 3'→5' acts as a template, and is also referred to as template strand.
NCERT Class 12th Pg. No.92

113. (2)
Primer required in DNA replication only.
NCERT Class 12th Pg. No.90-91

114. (1)
Promoters define the positions and the presence of template and coding strands in transcription unit.
NCERT Class 12th Pg. No.92

115. (1)
In a typical nucleus, some region of chromatin are loosely packed (and stains light) and are referred to as euchromatin.
NCERT Class 12th Pg. No.84

116. (3)
Methyl guanosine triphosphate is added at 5'end of mRNA in a process of capping.
NCERT Class 12th Pg. No.94-95

117. (3)
In tailing, adenylate residues (200-300) are added at 3'-end in a template independent manner.
NCERT Class 12th Pg. No.94-95

118. (1)
RNA polymerase III is responsible for transcription of tRNA, 5srRNA, and snRNAs (small nuclear RNAs)
NCERT Class 12th Pg. No.94-95

119. (1)
A-true, B -false
C-false, D-true
Eukaryotic RNA polymerase produces 28S rRNA. In eukaryotes, mRNA require processing to become active.
NCERT Class 12th Pg. No.91-95

120. (4)
All of the above happens if both the strands copied during transcription.
NCERT Class 12th Pg. No.91

121. (3)
5'AUG GGC UGC UAG 3'
NCERT Class 12th Pg. No.91-92

122. (3)
Meselson and Stahl conducted their famous experiments on DNA replication using *E.coli* bacteria as a model system. They began by growing *E.coli* in medium or nutrient both containing heavy isotope of Nitrogen ^{15}N. Refer NCERT Meselson and Stahl experiment.
NCERT Class 12th Pg. No.89

123. (2)
A set of three adjacent bases in the DNA or their complementary bases in messenger RNA that specifies the end of polypeptide chain.
UAA, UAG, UGA are stop codons.
NCERT Class 12th Pg. No.96

124. (2)
RNA was the first genetic material many essential life processes like splicing translation evolved around RNA. It is used to be important bio chemical reactions in living system
NCERT Class 12th Pg. No.88

125. (2)
When a DNA strand with the sequence AACGTAACG is transcribed, the resultant sequence of the mRNA molecule synthesized is UUGCAUUGC. This is based on the paring of nitrogenous bases - adenine pairs with thymine (in DNA) and uracil (in RNA) and guanine with cytosine.
NCERT Class 12th Pg. No.90-92

126. (2)
The coding sequence or expressed sequences are defined exons. The exons appear in mature or processed RNA and are interrupted by introns or intervening sequences which do not appear in mature or processed RNA.
NCERT Class 12th Pg. No.94-95

127. (3)

tRNA (or transfer RNA) is a single stranded RNA molecule which brings amino acid and reads the genetic code in the process of transcription. It helps decode a messenger RNA (mRNA) sequence into a protein. It functions at specific sites in the ribosome during translation, which is a process that synthesizes a protein from a mRNA molecule.

NCERT Class 12th Pg. No.98

128. (2)

Avery, MacLeod and McCarty [1944] showed the significance of DNA.

NCERT Class 12th Pg. No.85

129. (3)

A nitrogenous base is attached to the pentose sugar by an N-glycosidic linkage to form a nucleoside, i.e., Nucleoside = Nitrogen base + Pentose sugar. When a phosphate group is attached to the 5-OH of a nucleoside through phosphodiester linkage, a nucleotide is formed, *i.e.* Nucleotide = Nitrogen base + Pentose sugar + phosphate.

So, a nucleoside differs from a nucleotide as it lacks the phosphate group.

NCERT Class 12th Pg. No.80-81

130. (2)

An anticodon is a Trinucleotide sequence located at one end of a tRNA molecule which is complementary to corresponding codon in a messenger RNA (mRNA sequence

NCERT Class 12th Pg. No.98

131. (3)

AUG is the initiation codon on eukaryotes which codes for methionine amino acid.

NCERT Class 12th Pg. No.96

132. (2)

The codon is read in mRNA in a contiguous fashion.

NCERT Class 12th Pg. No.96

133. (1)

*r*RNA is the most abundant RNA (70-80%) and it has 3-4 types, e.g. 23S, 28S, etc., In eukaryotic animal cells, four types of *r*RNA are found 28S, 18S, 5.8S and 5S. On the other hand, *t*RNA constitutes about 15% and *m*RNA about 2-5% of the total RNA content of the cell.

NCERT Class 12th Pg. No.98

134. (3)

Option (3) is correct. Uracil is a nitrogen base of RNA molecule. Nucleoside is a compound formed by the combination of a nitrogen base with a pentose sugar, e.g. cytidine. While, nucleotide is a compound formed by the combination of a nitrogen base, pentose sugar and a phosphate group, e.g. thymidylic acids. Nucleic acids are polymeric compounds of nucleotides, e.g. DNA and RNA.

NCERT Class 12th Pg. No.80-81

135. (2)

Condensation product of adenine, ribose and phosphoric acid is adenylic acid

Adenine + Ribose $\rightarrow$ Adenosine (nucleoside)

Adenosine + H_3PO_4 $\rightarrow$ Adenylic acid (nucleotide)

NCERT Class 12th Pg. No.80-81

136. (4)

The correct combination of salient features of genetic code is degenerate, non-overlapping, non-ambiguous. These are explained as one codon codes for only one amino acid, hence genetic code is unambiguous and specific.

Some amino acids are coded by more than one codon, hence the code is degenerate. The codon is read in *m*RNA in a contiguous fashion. There are no punctuation and overlapping.

NCERT Class 12th Pg. No.96

137. (1)

Among the given options, only first one, i.e. AUG. UGA. UUU can be translated because it possesses an initiation codon, AUG which codes for methionine. Rest of the *m*RNA sequences start with termination codons, i.e. UAA (ochre), UAG (amber) and UGA (opal). Therefore, these cannot be translated.

NCERT Class 12th Pg. No.98

138. (1)

Option (1) is correct. The correct matches are as follows:

The coding sequences or expressed sequences are defined as exons. In capping, an unusual nucleotide (methyl guanosine triphosphate) is added to the 5' end of *hn*RNA. In tailing, adenylate residues (200-300) are added at 3'-end in a template independent manner.

Promoter is located adjacent to the operator that determines the site at which the RNA polymerase enzyme binds.

NCERT Class 12th Pg. No.93, 95, 92

139. (3)

Statements B is correct, but statement A is incorrect.

In eukaryotes, the primary transcript, i.e. *hn*RNA contains both introns and exons and is non-functional.

Therefore, it undergoes modification like splicing for removing introns and joining exons in the proper order. It further undergoes post-transcriptional modifications, i.e. capping and tailing, so that a fully processed *hn*RNA or *m*RNA is formed. It is transported out of the nucleus for translation.

NCERT Class 12th Pg. No.94, 93

140. (1)

Statement (1) is incorrect. The correct information regarding the statement is as follows: UAA (orchre) is a termination or non-sense codon and does not code for any amino acid. Lysine is coded by AAA and AAG. Rest of the statements are correct.

NCERT Class 12th Pg. No.96

141. (1)

Out of 64 codons three (UAA,)UAG, UGA) are chain terminating codons, the translating mechanism is not able to read these codons and 61 codons are used to code all the 20 essential amino acids.

NCERT Class 12th Pg. No.95-96

142. (3)

Degeneracy means lack of specificity. Presence of more than one meaningful codons for an amino acid is called degeneracy.

NCERT Class 12th Pg. No.96

143. (2)

The first phase of translation is aminoacylation of tRNA, i.e., activation of amino acids and the formation of AA-tRNA complex.

NCERT Class 12th Pg. No.98-99

144. (2)

In the process of protein synthesis, the messenger RNA (*m*RNA) is responsible for carrying the genetic code transcribed from DNA to specialised sites within the cell (called ribosomes) where the information is translated into protein.

NCERT Class 12th Pg. No.98-99

145. (1)

During the process of translation an initial complex is formed between mRNA, 30S ribosomal sub-unit and methionyl tRNA. This complex is formed due to the association of IF_1, IF_2, IF_3 initiation factors and GTP molecule.

NCERT Class 12th Pg. No.98-99

146. (3)

Protein synthesis is a complex process, it essentially involves DNA for the synthesis of mRNA (transcription) which contains information for the synthesis of proteins (translation).

NCERT Class 12th Pg. No.98-99

147. (2)

In eukaryotic cells, DNA is Accommodated by super-coiling in nucleosomes, typical nucleosome contains 200 bp of DNA helix.

Nucleosomes constitute the repeating unit of a structure in nucleus called chromatin.

NCERT Class 12th Pg. No.83

148. (4)

Chargaff rule is not applicable to RNA. This is the generalizations formulated about DNA structure.

NCERT Class 12th Pg. No.88

149. (4)

Both statements I and statement II are correct.

NCERT Class 12th Pg. No.88

150. (1)

The set of correct statements are (I), (III) and (IV). The incorrect statements can be corrected as The heterochromatin is more densely packed and stains dark. Euchromatin is said to be transcriptionally active chromatin, whereas heterochromatin is inactive. A typical nucleosome contains 200 bp of DNA helix.

NCERT Class 12th Pg. No.83-84

SECTION – IV (ZOOLOGY)

151. **(4)**
[NCERT XII Page No. 193]
Gene cloning, gene transfer and creation of Recombinant DNA technique include in Biotechnology.

152. **(4)**
[NCERT XII Page No. 195]
Identification of DNA with desirable genes
Introduction of Identified DNA into host.
Maintenance of introduced DNA in the host and transfer of the DNA to its progeny.

153. **(3)**
[NCERT XII Page No. 195]
In Recombinant DNA technology a plasmid vector is cleaved by the same enzymes that cleaves donor DNA.

154. **(4)**
[NCERT XII Page No. 202]
Steps to PCR technique are Denaturation, Annealing and Extension.

155. **(4)**
[NCERT XII Page No. 193-195]
The core technique of Biotechnology are genetic engineering and chemical engineering.

156. **(2)**
[NCERT XII Page No. 194]
The first recombinant DNA was isolated from *salmonella typhimurium* bacteria.

157. **(1)**
[NCERT XII Page No. 193, 194]
Genetic engineering possible because we can cut DNA at specific sites by restriction endonuclease.

158. **(3)**
[NCERT XII Page No. 199]
Biolistic or gene gun method in which plant cells are bombarded with high velocity microparticles of gold and tungsten coated with DNA

159. **(3)**
[NCERT XII Page No. 204,205]
After the formation of products in bioreactor it undergo through some processes before a finished product to be ready for marketing is downstream process.

160. **(3)**
[NCERT XII Page No. 199]
Ori is a sequences from when replication starts and any piece of DNA when linked to this sequence can be made replicate with in the host cell.

161. **(2)**
[NCERT XII Page No. 197]
5'GGATCC 3'
3' CCTAGG 5'
This is the palindromic sequence.

162. **(2)**
[NCERT XII Page No. 195]
The term Molecular scissor refer to Restriction endonuclease.

163. **(1)**
[NCERT XII Page No. 198]
Both statements are correct.

164. **(3)**
[NCERT XII Page No. 198]
In cloning vector multiple restriction sites give many different copies so that not preferred this.

165. **(2)**
[NCERT XII Page No. 201]
Transformation is a procedure through which a piece of DNA is introduced in host bacterium..

166. **(4)**
[NCERT XII Page No. 201]
While isolating DNA from bacteria Lysozyme, cellulase, Chitinase protease, Ribonuclease are used.

167. **(3)**
[NCERT XII Page No. 194]
Restriction enzyme isolated from bacteria.

168. **(3)**
[NCERT XII Page No. 200]
Ti plasmid of *Agrobacterium tumefaciens* is commonly used in the transfer of gene in crop plant.

169. **(1)**
[NCERT XII Page No. 199]
PBR 322 is plasmid vector.
BamII, ECORI, Sal I are genes.

170. **(3)**
[NCERT XII Page No. 202]
No. of DNA= 2^n
$= 2^6$
$= 2 \times 2 \times 2 \times 2 \times 2 \times 2$
= 64 copies

171. **(2)**
[NCERT XII Page No. 196]
Chitinase -Fungal cell.

172. **(2)**
[NCERT XII Page No. 200]
Retrovirus is a suitable vector for gene cloning in higher organism.

173. **(4)**
[NCERT XII Page No. 198]
In gel electrophoresis in the wells and towards negative electrode sample is loaded.

174. **(2)**
[NCERT XII Page No. 199]
An antibiotic resistance gene of plasmid vector which get inactivated due to insertion of alien DNA help the selection of Recombinant.

175. **(2)**
[NCERT XII Page No. 204]
In sparged stirred tank bioreactor air bubbles dramatically increase the oxygen transfer area.

176. **(3)**
[NCERT XII Page No. 194]
Stanley cohen and Herbert Boyer accomplished this in 1972 by isolating the antibiotic resistance gene and made first recombinant DNA.

177. **(1)**
[NCERT XII Page No. 198]
Gel electrophoresis used for separation of DNA fragments.

178. **(1)**
[NCERT XII Page No. 200]
DNA fragments are negatively charged

179. **(3)**
[NCERT XII Page No. 198]
Bacterial cell first be made competent to take up DNA. This is done by treating them with a specific concentration of a divalent cation such as calcium.

180. **(4)**
[NCERT XII Page No. 204]
A bioreactor has an agitator system an oxygen delivery system a foam control system and temperature control system, pH control system and sampling ports.

181. **(1)**
[NCERT XII Page No. 194, 195, 196, 202]
Plasmid → Circular extra chromosomal DNA
Bacteriophage → Virus infecting bacteria
Agarose → Natural polymer of D-galactose.
Selectable marker → Identification of Recombinants.

182. **(2)**
[NCERT XII Page No. 198]
Stained DNA is exposed to U.V. light.

183. **(3)**
[NCERT XII Page No.]
Colour of DNA visible under U.V. light after ethidium bromide staining is orange.

184. **(4)**
[NCERT XII Page No. 193]
EFB stands for European Federation of biotechnology.

185. **(2)**
[NCERT XII Page No. 195]
ECoRI comes from species *E coli*.

186. **(1)**
[NCERT XII Page No. 199]
A foreign DNA can be lighted at the Bam H1 site of tetracycline resistant gene in the vector PBR 322.

187. **(2)**
[NCERT XII Page No. 195]
Both assertion and Reason are true and Reason is not a correct explanation of Assertion.

188. **(4)**
[NCERT XII Page No. 201]
Heat shock is give at 42°C. A step of the process that enables introduction of alien DNA is the host cell.

189. **(4)**
[NCERT XII Page No. 198]
DNA fragment is separated according to their size.

190. **(2)**
[NCERT XII Page No. 196]
In ECoRI Roman numbers indicate the order in which the enzymes were isolated from the strain of bacteria.

191. **(2)**
[NCERT XII Page No. 195]
In the year 1963 the two enzymes responsible for restricting the growth of bacteriophage in *Ecoli*.

192. **(1)**
[NCERT XII Page No. 199]
Gene of interest was cloned at site Sal I in PBR 322. The recombinant plasmid will exhibit susceptibility to tetracyclin only.

193. **(1)**
[NCERT XII Page No. 202]
PCR stands for Polymerase chain Reaction.

194. **(2)**
[NCERT XII Page No. 202-203]
2 sets of primers are used in Polymerase chain reaction.

195. **(1)**
[NCERT XII Page No. 201]
The precipitated DNA is seen collection of fine thread in chilled ethanol.

196. **(4)**
[NCERT XII Page No. 194]
Biotechnology uses technique to alter the chemistry of DNA and RNA.

197. **(2)**
[NCERT XII Page No. 195]
DNA Ligase used to join the sticky ends.

198. **(2)**
[NCERT XII Page No. 201]
Microinjection is the method in which alien DNA is directly injected into the nucleus of an animal cell is known as microinjection.

199. **(1)**
[NCERT XII Page No. 200]
Taq polymerase isolated from Bacteria.

200. **(4)**
[NCERT XII Page No. 200]
Restriction endonuclease, exonuclease and cloning vector are tools of biotechnology.