2014

SUBJECT : PHYSICS	DAY – 2
SESSION : MORNING	TIME : 10.30 A.M. TO 11.50 A.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	548417

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 10.30 a.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The **3rd Bell rings at 10.40 a.m., till then;**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

SEAL

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the **3rd Bell is rung at 10.40 a.m.,** remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 11.50 a.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

1. A physical quantity Q is found to depend on observables x, y and z, obeying relation $Q = \frac{x^3y^2}{z}$. The percentage error in the measurements of x, y and z are 1%, 2% and 4% respectively. What is percentage error in the quantity Q ?

(1) 4 %
(2) 3 %
(3) 11 %
(4) 1 %

2. Which of the following is not a vector quantity ?

(1) Weight
(2) Nuclear spin
(3) Momentum
(4) Potential energy

3. A car moves from A to B with a speed of 30 kmph and from B to A with a speed of 20 kmph. What is the average speed of the car ?

(1) 25 kmph
(2) 24 kmph
(3) 50 kmph
(4) 10 kmph

4. A body starts from rest and moves with constant acceleration for t s. It travels a distance x_1 in first half of time and x_2 in next half of time, then

(1) $x_2 = x_1$
(2) $x_2 = 2x_1$
(3) $x_2 = 3x_1$
(4) $x_2 = 4x_1$

Space For Rough Work

5. A person is driving a vehicle at uniform speed of 5 ms^{-1} on a level curved track of radius 5 m. The coefficient of static friction between tyres and road is 0.1. Will the person slip while taking the turn with the same speed ? Take g = 10 ms^{-2}.

Choose the correct statement.

(1) A person will slip if $v^2 = 5\ ms^{-1}$ (2) A person will slip if $v^2 > 5\ ms^{-1}$

(3) A person will slip if $v^2 < 5\ ms^{-1}$ (4) A person will not slip if $v^2 > 10\ ms^{-1}$

6. A stone is thrown vertically at a speed of 30 ms^{-1} making an angle of 45° with the horizontal. What is the maximum height reached by the stone ? Take g = 10 ms^{-2}.

(1) 30 m (2) 22.5 m

(3) 15 m (4) 10 m

7. A force $\vec{F} = 5\hat{i} + 2\hat{j} - 5\hat{k}$ acts on a particle whose position vector is $\vec{r} = \hat{i} - 2\hat{j} + \hat{k}$. What is the torque about the origin ?

(1) $8\hat{i} + 10\hat{j} + 12\hat{k}$ (2) $8\hat{i} + 10\hat{j} - 12\hat{k}$

(3) $8\hat{i} - 10\hat{j} - 8\hat{k}$ (4) $10\hat{i} - 10\hat{j} - \hat{k}$

8. What is a period of revolution of earth satellite ? Ignore the height of satellite above the surface of earth.

Given : (1) The value of gravitational acceleration g = 10 ms^{-2}.

(2) Radius of earth R_E = 6400 km. Take $\pi = 3.14$.

(1) 85 minutes (2) 156 minutes

(3) 83.73 minutes (4) 90 minutes

Space For Rough Work

9. A period of geostationary satellite is

(1) 24 h (2) 12 h

(3) 30 h (4) 48 h

10. What is the source temperature of the Carnot engine required to get 70% efficiency ? Given sink temperature = 27 °C

(1) 1000 °C (2) 90 °C

(3) 270 °C (4) 727 °C

11. A 10 kg metal block is attached to a spring of spring constant 1000 Nm^{-1}. A block is displaced from equilibrium position by 10 cm and released. The maximum acceleration of the block is

(1) 10 ms^{-2} (2) 100 ms^{-2}

(3) 200 ms^{-2} (4) 0.1 ms^{-2}

12. A metallic wire of 1 m length has a mass of 10×10^{-3} kg. If a tension of 100 N is applied to a wire, what is the speed of transverse wave ?

(1) 100 ms^{-1} (2) 10 ms^{-1}

(3) 200 ms^{-1} (4) 0.1 ms^{-1}

13. A train is approaching towards a platform with a speed of 10 ms^{-1} while blowing a whistle of frequency 340 Hz. What is the frequency of whistle heard by a stationary observer on the platform ? Given speed of sound = 340 ms^{-1}.

(1) 330 Hz (2) 350 Hz

(3) 340 Hz (4) 360 Hz

Space For Rough Work

14. A rotating wheel changes angular speed from 1800 rpm to 3000 rpm in 20 s. What is the angular acceleration assuming to be uniform ?

(1) 60π rad s^{-2} (2) 90π rad s^{-2}

(3) 2π rad s^{-2} (4) 40π rad s^{-2}

15. A flow of liquid is streamline if the Reynold number is

(1) less than 1000 (2) greater than 1000

(3) between 2000 to 3000 (4) between 4000 to 5000

16. A pipe of 30 cm long and open at both the ends produces harmonics. Which harmonic mode of pipe resonates a 1.1 kHz source ? Given speed of sound in air = 330 ms^{-1}.

(1) Fifth harmonic (2) Fourth harmonic

(3) Third harmonic (4) Second harmonic

17. In anomalous expansion of water, at what temperature, the density of water is maximum ?

(1) 4 °C (2) < 4 °C

(3) > 4 °C (4) 10 °C

18. An aeroplane executes a horizontal loop at a speed of 720 kmph with its wings banked at 45°. What is the radius of the loop ? Take g = 10 ms^{-2}.

(1) 4 km (2) 4.5 km

(3) 7.2 km (4) 2 km

Space For Rough Work

19. A body having a moment of inertia about its axis of rotation equal to 3 kg-m^2 is rotating with angular velocity of 3 rad s^{-1}. Kinetic energy of this rotating body is same as that of a body of mass 27 kg moving with velocity v. The value of v is

(1) 1 ms^{-1} (2) 0.5 ms^{-1}

(3) 2 ms^{-1} (4) 1.5 ms^{-1}

20. A cycle tyre bursts suddenly. What is the type of this process ?

(1) Isothermal (2) Adiabatic

(3) Isochoric (4) Isobaric

21. An object is placed at 20 cm in front of a concave mirror produces three times magnified real image. What is focal length of the concave mirror ?

(1) 15 cm (2) 6.6 cm

(3) 10 cm (4) 7.5 cm

22. A focal length of a lens is 10 cm. What is power of a lens in dioptre ?

(1) 0.1 D (2) 10 D

(3) 15 D (4) 20 D

Space For Rough Work

23. A microscope is having objective of focal length 1 cm and eyepiece of focal length 6 cm. If tube length is 30 cm and image is formed at the least distance of distinct vision, what is the magnification produced by the microscope ? Take D = 25 cm.

(1) 6 (2) 150

(3) 25 (4) 125

24. A fringe width of a certain interference pattern is $\beta = 0.002$ cm. What is the distance of 5^{th} dark fringe from centre ?

(1) 1×10^{-2} cm (2) 11×10^{-2} cm

(3) 1.1×10^{-2} cm (4) 3.28×10^{6} cm

25. Diameter of the objective of a telescope is 200 cm. What is the resolving power of a telescope ? Take wavelength of light = 5000 Å.

(1) 6.56×10^{6} (2) 3.28×10^{5}

(3) 1×10^{6} (4) 3.28×10^{6}

26. A polarized light of intensity I_o is passed through another polarizer whose pass axis makes an angle of 60° with the pass axis of the former. What is the intensity of emergent polarized light from second polarizer ?

(1) $I = I_o$ (2) $I = I_o/6$

(3) $I = I_o/5$ (4) $I_o/4$

Space For Rough Work

27. What is the de Broglie wavelength of the electron accelerated through a potential difference of 100 Volt ?

(1) 12.27 Å (2) 1.227 Å

(3) 0.1227 Å (4) 0.001227 Å

28. The maximum kinetic energy of the photoelectrons depends only on

(1) potential (2) frequency

(3) incident angle (4) pressure

29. Which of the following spectral series of hydrogen atom is lying in visible range of electromagnetic wave ?

(1) Paschen series (2) Pfund series

(3) Lyman series (4) Balmer series

30. What is the energy of the electron revolving in third orbit expressed in eV ?

(1) 1.51 eV (2) 3.4 eV

(3) 4.53 eV (4) 4 eV

31. The relation between half life (T) and decay constant (λ) is

(1) $\lambda T = 1$ (2) $\lambda T = \frac{1}{2}$

(3) $\lambda T = \log_e 2$ (4) $\lambda = \log 2T$

Space For Rough Work

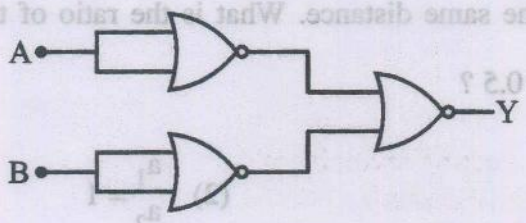
32. A force between two protons is same as the force between proton and neutron. The nature of the force is

(1) Weak nuclear force
(2) Strong nuclear force
(3) Electrical force
(4) Gravitational force

33. In n type semiconductor, electrons are majority charge carriers but it does not show any negative charge. The reason is

(1) electrons are stationary
(2) electrons neutralize with holes
(3) mobility of electrons is extremely small
(4) atom is electrically neutral

34. For the given digital circuit, write the truth table and identify the logic gate it represents :



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

35. If α-current gain of a transistor is 0.98. What is the value of β-current gain of the transistor ?

(1) 0.49
(2) 49
(3) 4.9
(4) 5

Space For Rough Work

36. A tuned amplifier circuit is used to generate a carrier frequency of 2 MHz for the amplitude modulation. The value of $\sqrt{LC}$ is

(1) $\frac{1}{2\pi \times 10^6}$ (2) $\frac{1}{2 \times 10^6}$

(3) $\frac{1}{3\pi \times 10^6}$ (4) $\frac{1}{4\pi \times 10^6}$

37. If a charge on the body is 1 nC, then how many electrons are present on the body ?

(1) 1.6×10^{19} (2) 6.25×10^9

(3) 6.25×10^{27} (4) 6.25×10^{28}

38. Two equal and opposite charges of masses m_1 and m_2 are accelerated in an uniform electric field through the same distance. What is the ratio of their accelerations if their ratio of masses is $\frac{m_1}{m_2} = 0.5$?

(1) $\frac{a_1}{a_2} = 0.5$ (2) $\frac{a_1}{a_2} = 1$

(3) $\frac{a_1}{a_2} = 2$ (4) $\frac{a_1}{a_2} = 3$

39. What is the nature of Gaussian surface involved in Gauss law of electrostatic ?

(1) Scalar (2) Electrical

(3) Magnetic (4) Vector

Space For Rough Work

40. What is the electric potential at a distance of 9 cm from 3 nC ?

(1) 270 V (2) 3 V

(3) 300 V (4) 30 V

41. A voltmeter reads 4 V when connected to a parallel plate capacitor with air as a dielectric. When a dielectric slab is introduced between plates for the same configuration, voltmeter reads 2 V. What is the dielectric constant of the material ?

(1) 0.5 (2) 2

(3) 8 (4) 10

42. A spherical conductor of radius 2 cm is uniformly charged with 3 nC. What is the electric field at a distance of 3 cm from the centre of the sphere ?

(1) 3×10^6 V m^{-1} (2) 3 V m^{-1}

(3) 3×10^4 V m^{-1} (4) 3×10^{-4} V m^{-1}

43. A carbon film resistor has colour code Green Black Violet Gold. The value of the resistor is

(1) 50 MΩ (2) 500 MΩ

(3) 500 ± 5% MΩ (4) 500 ± 10% MΩ

44. Two resistors of resistances 2 Ω and 6 Ω are connected in parallel. This combination is then connected to a battery of emf 2V and internal resistance 0.5 Ω. What is the current flowing through the battery ?

(1) 4 A (2) $\frac{4}{3}$ A

(3) $\frac{4}{17}$ A (4) 1 A

Space For Rough Work

45. The equivalent resistance of two resistors connected in series is 6 Ω and their parallel equivalent resistance is $\frac{4}{3}$ Ω. What are the values of resistances ?

(1) 4 Ω, 6 Ω (2) 8 Ω, 1 Ω

(3) 4 Ω, 2 Ω (4) 6 Ω, 2 Ω

46. In a potentiometer experiment of a cell of emf 1.25 V gives balancing length of 30 cm. If the cell is replaced by another cell, balancing length is found to be 40 cm. What is the emf of second cell ?

(1) $\simeq$ 1.57 V (2) $\simeq$ 1.67 V

(3) $\simeq$ 1.47 V (4) $\simeq$ 1.37 V

47. A charged particle experiences magnetic force in the presence of magnetic field. Which of the following statement is correct ?

(1) The particle is moving and magnetic field is perpendicular to the velocity.

(2) The particle is moving and magnetic field is parallel to velocity.

(3) The particle is stationary and magnetic field is perpendicular.

(4) The particle is stationary and magnetic field is parallel.

48. If a velocity has both perpendicular and parallel components while moving through a magnetic field, what is the path followed by a charged particle ?

(1) Circular (2) Elliptical

(3) Linear (4) Helical

Space For Rough Work

49. A solenoid has length 0.4 cm, radius 1 cm and 400 turns of wire. If a current of 5 A is passed through this solenoid, what is the magnetic field inside the solenoid ?

(1) 6.28×10^{-4} T (2) 6.28×10^{-3} T

(3) 6.28×10^{-7} T (4) 6.28×10^{-6} T

50. A gyromagnetic ratio of the electron revolving in a circular orbit of hydrogen atom is 8.8×10^{10} C kg^{-1}. What is the mass of the electron ? Given charge of the electron = 1.6×10^{-19} C.

(1) 1×10^{-29} kg (2) 0.1×10^{-29} kg

(3) 1.1×10^{-29} kg (4) $\frac{1}{11} \times 10^{-29}$ kg

51. What is the value of shunt resistance required to convert a galvanometer of resistance 100 Ω into an ammeter of range 1A ?

Given : Full scale deflection of the galvanometer is 5 mA.

(1) $\frac{5}{9.95}\Omega$ (2) $\frac{9.95}{5}\Omega$

(3) 0.5 Ω (4) 0.05 Ω

52. A circular coil of radius 10 cm and 100 turns carries a current 1A. What is the magnetic moment of the coil ?

(1) 3.142×10^4 A m^2 (2) 10^4 A m^2

(3) 3.142 A m^2 (4) 3 A m^2

Space For Rough Work

53. A susceptibility of a certain magnetic material is 400. What is the class of the magnetic material ?

(1) Diamagnetic (2) Paramagnetic

(3) Ferromagnetic (4) Ferroelectric

54. A solenoid of inductance 2H carries a current of 1 A. What is the magnetic energy stored in a solenoid ?

(1) 2 J (2) 1 J

(3) 4 J (4) 5 J

55. A multimeter reads a voltage of a certain A.C. source as 100 V. What is the peak value of voltage of A.C. source ?

(1) 200 V (2) 100 V

(3) 141.4 V (4) 400 V

56. A series LCR circuit contains inductance 5 mH, capacitance 2 μF and resistance 10 Ω. If a frequency A.C. source is varied, what is the frequency at which maximum power is dissipated ?

(1) $\frac{10^5}{\pi}$ Hz (2) $\frac{10^{-5}}{\pi}$ Hz

(3) $\frac{2}{\pi} \times 10^5$ Hz (4) $\frac{5}{\pi} \times 10^3$ Hz

Space For Rough Work

57. A step down transformer has 50 turns on secondary and 1000 turns on primary winding. If a transformer is connected to 220 V 1A A.C. source, what is output current of the transformer ?

(1) $\frac{1}{20}$ A (2) 20 A

(3) 100 A (4) 2 A

58. The average power dissipated in A.C. circuit is 2 watt. If a current flowing through a circuit is 2 A and impedance is 1 Ω, what is the power factor of the AC circuit ?

(1) 0.5 (2) 1

(3) 0 (4) $\frac{1}{\sqrt{2}}$

59. A plane electromagnetic wave of frequency 20 MHz travels through a space along x direction. If the electric field vector at a certain point in space is 6 V m^{-1}, what is the magnetic field vector at that point ?

(1) 2×10^{-8} T (2) $\frac{1}{2} \times 10^{-8}$ T

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

60. Two capacitors of 10 PF and 20 PF are connected to 200 V and 100 V sources respectively. If they are connected by the wire, what is the common potential of the capacitors ?

(1) 133.3 volt (2) 150 volt

(3) 300 volt (4) 400 volt

Space For Rough Work

A-1

SEAL

2014

SUBJECT : CHEMISTRY	DAY–2
SESSION : AFTERNOON	TIME : 02.30 P.M. TO 03.50 P.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	751905

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 2.30 p.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The **3rd Bell rings at 2.40 p.m., till then;**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

SEAL

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the **3rd Bell is rung at 2.40 p.m.,** remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 3.50 p.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

1. 25 cm^3 of oxalic acid completely neutralised 0.064 g of sodium hydroxide. Molarity of the oxalic acid solution is

(1) 0.045 (2) 0.032

(3) 0.064 (4) 0.015

2. The statement that is NOT correct is

(1) Energies of stationary states in hydrogen like atoms is inversely proportional to the square of the principal quantum number.

(2) The radius of the first orbit of He^+ is half that of the first orbit of hydrogen atom.

(3) Angular quantum number signifies the shape of the orbital.

(4) Total number of nodes for 3s orbital is three.

3. For the equilibrium :

$CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$; $K_p = 1.64$ atm at 1000 K

50 g of $CaCO_3$ in a 10 litre closed vessel is heated to 1000 K. Percentage of $CaCO_3$ that remains unreacted at equilibrium is

(Given R = 0.082 L atm K^{-1} mol^{-1})

(1) 50 (2) 20

(3) 40 (4) 60

4. Conversion of oxygen into ozone is non-spontaneous at

(1) high temperature (2) low temperature

(3) all temperatures (4) room temperature

Space For Rough Work

5. Density of carbon monoxide is maximum at

(1) 0.5 atm and 273 K (2) 4 atm and 500 K

(3) 2 atm and 600 K (4) 6 atm and 1092 K

6. The acid strength of active methylene group in

(a) $CH_3COCH_2COOC_2H_5$

(b) $CH_3COCH_2COCH_3$

(c) $C_2H_5OOCCH_2COOC_2H_5$ decreases as

(1) a > b > c (2) c > a > b

(3) a > c > b (4) b > a > c

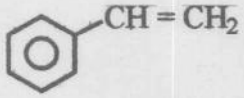
7. A metallic oxide reacts with water to form its hydroxide, hydrogen peroxide and also liberates oxygen. The metallic oxide could be

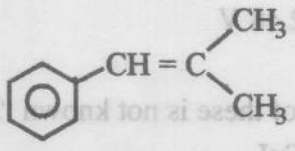
(1) KO_2 (2) Na_2O_2

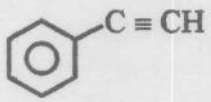
(3) CaO (4) Li_2O

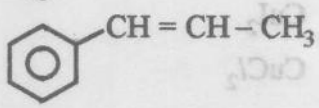
8. $X \xrightarrow[\text{(Reductive)}]{\text{Ozonolysis}} Y + Z$

Y can be obtained by Etard's reaction, Z undergoes disproportionation reaction with concentrated alkali. X could be

(1) 

(2) 

(3) 

(4) 

Space For Rough Work

9. Gold Sol is not

(1) a lyophobic colloid
(2) negatively charged colloid
(3) a macro molecular colloid
(4) a multimolecular colloid

10. Carbocation as an intermediate is likely to be formed in the reaction :

(1) Acetone + HCN $\xrightarrow{^{-}OH}$ acetonecyanohydrin
(2) Hexane $\xrightarrow{\text{Anhy. } AlCl_3 / HCl}$ 2-methyl pentane
(3) Propene + Cl_2 $\xrightarrow{h\nu}$ 2-chloropropane
(4) Ethylbromide + Aq KOH $\xrightarrow{\Delta}$ ethyl alcohol

11. For an ideal binary liquid mixture

(1) $\Delta H_{(mix)} = 0 ; \Delta S_{(mix)} < 0$
(2) $\Delta S_{(mix)} > 0 ; \Delta G_{(mix)} < 0$
(3) $\Delta S_{(mix)} = 0 ; \Delta G_{(mix)} = 0$
(4) $\Delta V_{(mix)} = 0 ; \Delta G_{(mix)} > 0$

12. For hydrogen – oxygen fuel cell at one atm and 298 K

$$H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow H_2O_{(l)}; \Delta G^\circ = -240 \text{ kJ}$$

E° for the cell is approximately,
(Given F = 96,500 C)

(1) 1.24 V
(2) 1.26 V
(3) 2.48 V
(4) 2.5 V

13. Which one of these is not known ?

(1) CuI_2
(2) $CuBr_2$
(3) $CuCl_2$
(4) CuF_2

Space For Rough Work

14. The correct statement is

(1) The extent of actinoid contraction is almost the same as lanthanoid contraction.

(2) Ce^{+4} in aqueous solution is not known.

(3) The earlier members of lanthanoid series resemble calcium in their chemical properties.

(4) In general, lanthanoids and actinoids do not show variable oxidation states.

15. $P \xrightarrow[2.\ H_3O^+]{1.\ CH_3MgBr} R \xrightarrow[2.\quad \Delta]{1.\ \text{dil. NaOH}}$ 4–methylpent–3–en–2–one

P is

(1) ethanamine (2) ethanal

(3) propanone (4) ethanenitrile

16. When $CH_2 = CH - O - CH_2 - CH_3$ reacts with one mole of HI, one of the products formed is

(1) ethanol (2) ethanal

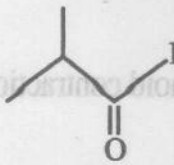
(3) ethane (4) iodoethene

17. 0.44 g of a monohydric alcohol when added to methylmagnesium iodide in ether liberates at S.T.P., 112 cm^3 of methane. With PCC the same alcohol forms a carbonyl compound that answers silver mirror test. The monohydric alcohol is

(1) $(CH_3)_3C - CH_2OH$ (2) $(CH_3)_2CH - CH_2OH$

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

Space For Rough Work

18.  + $CH_3MgBr \xrightarrow{\text{ether}}$ 'A' $\xrightarrow{H_3O^+}$ B

The IUPAC name of 'B' is

(1) 2–methylbutan–3–ol
(2) Pentan–2–ol
(3) 3–methylbutan–2–ol
(4) 2–methylbutan–2–ol

19. For Freundlich isotherm a graph of $\log \frac{x}{m}$ is plotted against log P. The slope of the line and its y-axis intercept, respectively corresponds to

(1) $\log \frac{1}{n}$, k
(2) $\log \frac{1}{n}$, log k
(3) $\frac{1}{n}$, k
(4) $\frac{1}{n}$, log k

20. A plot of $\frac{1}{T}$ Vs. k for a reaction gives the slope -1×10^4 K. The energy of activation for the reaction is

(Given R = 8.314 J K^{-1} mol^{-1})

(1) 1.202 kJ mol^{-1}
(2) 83.14 kJ mol^{-1}
(3) 8314 J mol^{-1}
(4) 12.02 J mol^{-1}

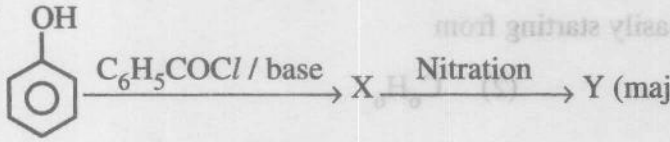
21. The IUPAC name of the complex ion formed when gold dissolves in aquaregia is

(1) tetrachloridoaurate(I)
(2) dichloridoaurate(III)
(3) tetrachloridoaurate(III)
(4) tetrachloridoaurate(II)

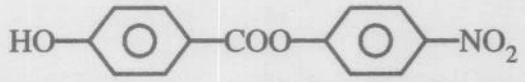
22. The correct sequence of reactions to be performed to convert benzene into m-bromoaniline is

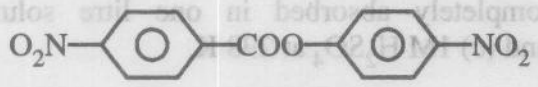
(1) bromination, nitration, reduction
(2) reduction, nitration, bromination
(3) nitration, reduction, bromination
(4) nitration, bromination, reduction

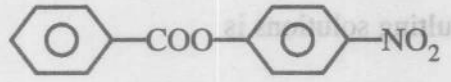
Space For Rough Work

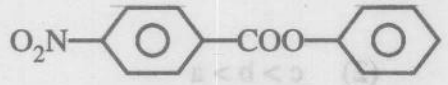
23. 

Y is

(1) 

(2) 

(3) 

(4) 

24. $A_{(g)} \xrightarrow{\Delta} P_{(g)} + Q_{(g)} + R_{(g)}$, follows first order kinetics with a half life of 69.3 s at 500 °C. Starting from the gas 'A' enclosed in a container at 500 °C and at a pressure of 0.4 atm, the total pressure of the system after 230 s will be

(1) 1.32 atm (2) 1.12 atm

(3) 1.15 atm (4) 1.22 atm

25. $MnO_2 + HCl \xrightarrow{\Delta} A_{(g)}$

$A_{(g)} + F_{2(excess)} \xrightarrow{573\ K} B_{(g)}$

$B_{(l)} + U_{(s)} \longrightarrow C_{(g)} + D_{(g)}$

The gases A, B, C and D are respectively

(1) Cl_2, ClF_3, UF_6, ClF (2) O_2, O_2F_2, U_2O_3, OF_2

(3) Cl_2, ClF, UF_6, ClF_3 (4) O_2, OF_2, U_2O_3, O_2F_2

Space For Rough Work

26. Acetophenone cannot be prepared easily starting from

(1) $C_6H_5CH_3$ (2) C_6H_6

(3) $C_6H_5CH(OH)CH_3$ (4) $C_6H_5C \equiv CH$

27. One mole of ammonia was completely absorbed in one litre solution each of (a) 1M HCl, (b) 1M CH_3COOH and (c) 1M H_2SO_4 at 298 K.

The decreasing order for the pH of the resulting solutions is

(Given $K_b(NH_3) = 4.74$)

(1) a > b > c (2) c > b > a

(3) b > c > a (4) b > a > c

28. 5.5 mg of nitrogen gas dissolves in 180 g of water at 273 K and one atm pressure due to nitrogen gas. The mole fraction of nitrogen in 180 g of water at 5 atm nitrogen pressure is approximately

(1) 1×10^{-5} (2) 1×10^{-4}

(3) 1×10^{-6} (4) 1×10^{-3}

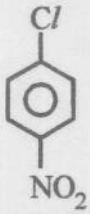
29. 50 cm^3 of 0.04 M $K_2Cr_2O_7$ in acidic medium oxidizes a sample of H_2S gas to sulphur. Volume of 0.03 M $KMnO_4$ required to oxidize the same amount of H_2S gas to sulphur, in acidic medium is

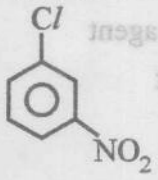
(1) 80 cm^3 (2) 120 cm^3

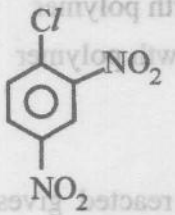
(3) 60 cm^3 (4) 90 cm^3

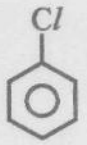
Space For Rough Work

30. The compound that reacts the fastest with sodium methoxide is

(1) 

(2) 

(3) 

(4) 

31. The pair of compounds having identical shapes for their molecules is

(1) BCl_2, ClF_3 (2) SO_2, CO_2

(3) CH_4, SF_4 (4) XeF_2, $ZnCl_2$

32. Conductivity of a saturated solution of a sparingly soluble salt AB at 298 K is 1.85×10^{-5} S m^{-1}. Solubility product of the salt AB at 298 K is

Given $\Lambda_m^\circ(AB) = 140 \times 10^{-4}$ S m^2 mol^{-1}

(1) 1.32×10^{-12} (2) 1.74×10^{-12}

(3) 5.7×10^{-12} (4) 7.5×10^{-12}

33. An incorrect statement with respect to S_N1 and S_N2 mechanisms for alkyl halide is

(1) Competing reaction for an S_N2 reaction is rearrangement.

(2) A weak nucleophile and a protic solvent increases the rate or favours S_N1 reaction.

(3) A strong nucleophile in an aprotic solvent increases the rate or favours S_N2 reaction.

(4) S_N1 reactions can be catalysed by some Lewis acids.

Space For Rough Work

34. Butylated hydroxy toluene as a food additive acts as

(1) flavouring agent
(2) emulsifier
(3) antioxidant
(4) colouring agent

35. Terylene is NOT a

(1) polyester fibre
(2) step growth polymer
(3) copolymer
(4) chain growth polymer

36. The correct statement is

(1) One mole each of benzene and hydrogen when reacted gives 1/3 mole of cyclohexane and 2/3 mole unreacted hydrogen.
(2) It is easier to hydrogenate benzene when compared to cyclohexene.
(3) Cyclohexadiene and cyclohexene cannot be isolated with ease during controlled hydrogenation of benzene.
(4) Hydrogenation of benzene to cyclohexane is an endothermic process.

37. Among the elements from atomic number 1 to 36, the number of elements which have an unpaired electron in their s subshell is

(1) 7
(2) 9
(3) 4
(4) 6

38. The statement that is NOT correct is

(1) Van der Waals constant 'a' measures extent of intermolecular attractive forces for real gases.
(2) Boyle point depends on the nature of real gas.
(3) Compressibility factor measures the deviation of real gas from ideal behaviour.
(4) Critical temperature is the lowest temperature at which liquefaction of a gas first occurs.

Space For Rough Work

39. The correct arrangement for the ions in the increasing order of their radii is

(1) Ca^{+2}, K^{+}, S^{-2} (2) Cl^{-}, F^{-}, S^{-2}

(3) Na^{+}, Cl^{-}, Ca^{+2} (4) Na^{+}, Al^{+3}, Be^{+2}

40. The correct arrangement of the species in the decreasing order of the bond length between carbon and oxygen in them is

(1) $CO_2, HCO_2^{-}, CO, CO_3^{-2}$ (2) $CO, CO_3^{-2}, CO_2, HCO_2^{-}$

(3) $CO, CO_2, HCO_2^{-}, CO_3^{-2}$ (4) $CO_3^{-2}, HCO_2^{-}, CO_2, CO$

41. The species that is not hydrolysed in water is

(1) BaO_2 (2) CaC_2

(3) P_4O_{10} (4) Mg_3N_2

42. For the properties mentioned, the correct trend for the different species is in

(1) inert pair effect – $Al > Ga > In$

(2) first ionization enthalpy – $B > Al > Tl$

(3) strength as Lewis acid – $BCl_3 > AlCl_3 > GaCl_3$

(4) oxidising property – $Al^{+3} > In^{+3} > Tl^{+3}$

43. A correct statement is

(1) $[MnBr_4]^{-2}$ is tetrahedral.

(2) $[Ni(NH_3)_6]^{+2}$ is an inner orbital complex.

(3) $[Co(NH_3)_6]^{+2}$ is paramagnetic.

(4) $[CoBr_2(en)_2]^{-}$ exhibits linkage isomerism.

Space For Rough Work

44. Iodoform reaction is answered by all, except

(1) CH_3CHO (2) $CH_3 - CH_2 - CH_2OH$

(3) $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - COOH$ (4) $CH_3 - CH_2 - OH$

45. A crystalline solid XY_3 has ccp arrangement for its element Y. X occupies

(1) 33% of tetrahedral voids (2) 33% of octahedral voids

(3) 66% of tetrahedral voids (4) 66% of octahedral voids

46. $C_6H_5COOH \xrightarrow[2.\ \Delta]{1.\ NH_3} P \xrightarrow{NaOBr} Q \xrightarrow[2.\ \text{heat to 460 K}]{1.\ \text{Conc. } H_2SO_4}$ 'R'

'R' is

(1) sulphanilamide (2) p-bromo sulphanilamide

(3) o-bromo sulphanilic acid (4) sulphanilic acid

47. The statement that is NOT correct is

(1) Carbohydrates are optically active.

(2) Lactose has glycosidic linkage between C_4 of glucose and C_1 of galactose unit.

(3) Aldose or ketose sugars in alkaline medium do not isomerise.

(4) Penta acetate of glucose does not react with hydroxylamine.

Space For Rough Work

48. Match the reactant in Column – I with the reaction in Column – II :

I	II
(i) Acetic acid	(a) Stephen
(ii) Sodium phenate	(b) Friedel-Crafts
(iii) Methyl cyanide	(c) HVZ
(iv) Toluene	(d) Kolbe's

(1) i – d, ii – b, iii – c, iv – a (2) i – c, ii – d, iii – a, iv – b

(3) i – c, ii – a, iii – d, iv – b (4) i – b, ii – c, iii – a, iv – d

49. The statement that is NOT correct is

(1) In solid state PCl_5 exists as $[PCl_4]^+[PCl_6]^-$

(2) Phosphorous acid on heating disproportionates to give metaphosphoric acid and phosphine.

(3) Hypophosphorous acid reduces silver nitrate to silver.

(4) Pure phosphine is non-inflammable.

50. In which one of the pairs of ion given, there is an ion that forms a co-ordination compound with both aqueous sodium hydroxide and ammonia and an other ion that forms a co-ordination compound only with aqueous sodium hydroxide ?

(1) Zn^{+2}, Al^{+3} (2) Al^{+3}, Cu^{+2}

(3) Pb^{+2}, Cu^{+2} (4) Cu^{+2}, Zn^{+2}

51. A crystalline solid X reacts with dil. HCl to liberate a gas Y. Y decolourises acidified $KMnO_4$. When a gas 'Z' is slowly passed into an aqueous solution of Y, colloidal sulphur is obtained. X and Z could be, respectively

(1) Na_2SO_4, H_2S (2) Na_2SO_4, SO_2

(3) Na_2S, SO_3 (4) Na_2SO_3, H_2S

Space For Rough Work

52. An aromatic compound 'A' (C_7H_9N) on reacting with $NaNO_2/HCl$ at 0 °C forms benzyl alcohol and nitrogen gas. The number of isomers possible for the compound 'A' is

(1) 7 (2) 6

(3) 5 (4) 3

53. The statement that is NOT correct is

(1) Collectors enhance the wettability of mineral particles during froth flotation.

(2) Copper from its low grade ores is extracted by hydrometallurgy.

(3) A furnace lined with Haematite is used to convert cast iron to wrought iron.

(4) In vapour phase refining, metal should form a volatile compound.

54. A solution of 1.25 g of 'P' in 50 g of water lowers freezing point by 0.3 °C. Molar mass of 'P' is 94. $K_{f(water)} = 1.86$ K kg mol^{-1}. The degree of association of 'P' in water is

(1) 60 % (2) 75 %

(3) 80 % (4) 65 %

55. Volume occupied by single CsCl ion pair in a crystal is 7.014×10^{-23} cm^3. The smallest Cs – Cs internuclear distance is equal to length of the side of the cube corresponding to volume of one CsCl ion pair. The smallest Cs to Cs internuclear distance is nearly

(1) 4.3 Å (2) 4.5 Å

(3) 4.4 Å (4) 4 Å

56. For $Cr_2O_7^{-2} + 14H^+ + 6e^- \rightarrow 2Cr^{+3} + 7H_2O$; $E° = 1.33$ V At $[Cr_2O_7^{-2}] = 4.5$ millimole, $[Cr^{+3}] = 15$ millimole, E is 1.067 V. The pH of the solution is nearly equal to

(1) 3 (2) 4

(3) 2 (4) 5

Space For Rough Work

57. 1.78 g of an optically active L-amino acid (A) is treated with $NaNO_2/HCl$ at 0 °C. 448 cm^3 of nitrogen was at STP is evolved. A sample of protein has 0.25% of this amino acid by mass. The molar mass of the protein is

(1) 34,500 g mol^{-1} (2) 35,600 g mol^{-1}

(3) 36,500 g mol^{-1} (4) 35,400 g mol^{-1}

58. 10 g of a mixture of BaO and CaO requires 100 cm^3 of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately

(Given : molar mass of BaO = 153)

(1) 55.1 (2) 47.4

(3) 52.6 (4) 44.9

59. The ratio of heats liberated at 298 K from the combustion of one kg of coke and by burning water gas obtained from kg of coke is

(Assume coke to be 100% carbon.)

(Given enthalpies of combustion of CO_2, CO and H_2 as 393.5 kJ, 285 kJ, 285 kJ respectively all at 298 K.)

(1) 0.69 : 1 (2) 0.96 : 1

(3) 0.79 : 1 (4) 0.86 : 1

60. Impure copper containing Fe, Au, Ag as impurities is electrolytically refined. A current of 140 A for 482.5 s decreased the mass of the anode by 22.26 g and increased the mass of cathode by 22.011 g. Percentage of iron in impure copper is

(Given molar mass Fe = 55.5 g mol^{-1}, molar mass Cu = 63.54 g mol^{-1})

(1) 0.85 (2) 0.90

(3) 0.95 (4) 0.97

Space For Rough Work

SEAT

A-1

2014

SUBJECT : BIOLOGY	DAY – 1
SESSION : MORNING	TIME : 10.30 A.M. TO 11.50 A.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	149073

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 10.30 a.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The **3rd Bell rings at 10.40 a.m., till then;**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

SEAL

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the **3rd Bell is rung at 10.40 a.m.,** remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

(1) ● (3) (4)

4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 11.50 a.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

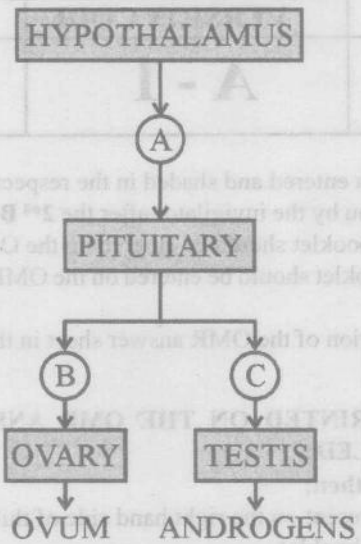
[Turn Over

1. Mating of two varieties of a cattle breed like Red Dane which have no common ancestors on either side of their pedigree up to 4-6 generations is an example for _____.

(1) Inbreeding (2) Cross breeding

(3) Out crossing (4) Inter-specific hybridization

2. Identify the hormones 'A', 'B' and 'C' that are labelled in the given flow chart :



(1) A – GnRH, B – ICSH, C – FSH

(2) A – GH, B – FSH, C – LH

(3) A – GnRH, B – PRL, C – ICSH

(4) A – GnRH, B – FSH, C – LH

3. **Statement A :** Photorespiration decreases photosynthetic output.

Statement B : In photorespiratory pathway, neither ATP nor NADPH is produced.

(1) Both the statements A and B are correct.

(2) Both the statements A and B are wrong.

(3) Statement A is correct and statement B is wrong.

(4) Statement B is correct and statement A is wrong.

Space For Rough Work

4. Identify the incorrect statement from the following :
   (1) The reservoir pool for phosphorous cycle is earth's crust whereas atmosphere is the reservoir pool for carbon cycle.
   (2) During carbon cycle and phosphorous cycle, there is very little respiratory release of carbon and phosphorous respectively.
   (3) Atmospheric inputs of phosphorous through rainfall are much smaller than carbon inputs.
   (4) Gaseous exchanges of phosphorous between organism and environment are negligible.

5. The result of the following reaction/experiment carried out by Avery et. al. on *Streptococcus pneumoniae* has proved conclusively that DNA is the genetic material ;
   (1) Live 'R' strain + DNA from 'S' strain + DNAase
   (2) Heat killed 'R' strain + DNA from 'S' strain + DNAase
   (3) Live 'R' strain + DNA from 'S' strain + RNAase
   (4) Live 'R' strain + Denatured DNA of 'S' strain + protease

6. Match the storage products listed under Column-I with the organisms given under Column-II; choose the appropriate option from the given choices.

	Column – I		**Column – II**
A.	Glycogen	p.	*Sargassum*
B.	Pyrenoids	q.	*Nostoc*
C.	Laminarin and mannitol	r.	*Polysiphonia*
D.	Floridean starch	s.	*Spirogyra*
		t.	*Agaricus*

   (1) A-r, B-s, C-p, D-t (2) A-s, B-r, C-t, D-q
   (3) A-t, B-s, C-p, D-r (4) A-q, B-p, C-s, D-r

7. Identify the desirable characteristics for a plasmid used in rDNA technology from the following :
   A. Ability to multiply and express outside the host in a bioreactor
   B. A highly active promoter
   C. A site at which replication can be initiated
   D. One or more identifiable marker genes
   E. One or more unique restriction sites
   (1) A, C and E only (2) B, C and E only
   (3) A, C, D and E only (4) B, C, D and E only

Space For Rough Work

8. Which compounds were used by Miller in his experiment for obtaining amino acids and other organic substances ?

(1) Carbon dioxide, water vapour and methane
(2) Methane, ammonia, water vapour and hydrogen cyanide
(3) Ammonia, methane, hydrogen and water vapour
(4) Ammonia, methane and carbon dioxide

9. Which of the following is true for eutrophicated water body ?

(1) High mineral content (2) High oxygen content
(3) Rich species diversity (4) Low organic content

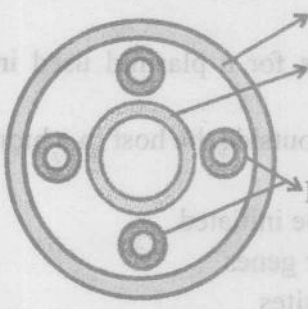
10. IUDs which are used by females _____.

(1) act as spermicidal jellies
(2) block the entry of sperms into vagina
(3) are implanted under the skin and they release progestogen and estrogen
(4) release copper ions in the uterus that increase phagocytosis of sperms

11. Which of the following hormones are secreted in large quantities during pregnancy in women ?

(1) hCG, progesterone, estradiol and FSH
(2) hCG, hPL, progesterone, estrogen and LH
(3) LH, estrogen and estradiol
(4) hCG and hPL

12. The kind of coelom represented in the diagram given below is characteristic of :



(1) Earthworm (2) Cockroach
(3) Round worm (4) Tape worm

Space For Rough Work

13. With respect to angiosperms, identify the incorrect pair from the following :
(1) Antipodals – 2n
(2) Vegetative cell of male gametophyte – n
(3) Primary endosperm nucleus – 3n
(4) Cells of nucellus of ovule – 2n

14. **Statement A :** For a particular character in an individual, each gamete gets only one allele.
Statement B : Chromatids of a chromosome split (separate) and move towards opposite poles during anaphase of mitosis.
(1) Both the statements are correct and B is the reason for A.
(2) Both the statements are correct and B is not the reason for A.
(3) Statement A is correct and statement B is wrong.
(4) Statement B is correct and statement A is wrong.

15. Internal bleeding, muscular pain, blockage of the intestinal passage and anaemia are some of the symptoms caused due to infection by _____.
(1) *Wuchereria* (2) *Trichophyton*
(3) *Ascaris* (4) *Plasmodium*

16. RNA interference which is employed in making tobacco plant resistant to *Meloidegyne incognita* is essentially involved in _____.
(1) preventing the process of translation of mRNA
(2) preventing the process of transcription
(3) preventing the process of replication of DNA
(4) preventing the process of splicing of hnRNA

17. The success of mammals on earth is largely because;
(1) They can conform to the changes in the environment.
(2) They can reduce metabolic activity and go into a state of dormancy during unfavourable conditions in the environment.
(3) They have the ability to maintain constant body temperature.
(4) They can take care of their young ones as they have mammary glands to suckle them.

Space For Rough Work

18. Which one of the following hormones also produces anti-inflammatory reactions in man and suppresses the immune response in addition to its primary functions ?

(1) Cortisol (2) Thymosin
(3) Thyrocalcitonin (4) Erythropoietin

19. Match the microbial products listed under Column-I with the related microbes given under Column-II; choose the appropriate option from the given choices.

Column – I		Column – II	
A.	Citric acid	p.	*Methanobacterium*
B.	Cyclosporin A	q.	*Monascus purpureus*
C.	Statin	r.	*Aspergillus niger*
D.	Gobar gas	s.	*Trichoderma polysporum*
		t.	*Clostridium butylicum*

(1) A-r, B-s, C-q, D-p
(2) A-t, B-q, C-s, D-r
(3) A-q, B-s, C-t, D-r
(4) A-r, B-s, C-q, D-t

20. *Marchantia* is considered as a heterothallic plant because it is _____.

(1) Heterogametic (2) Bisexual
(3) Monoecious (4) Dioecious

21. Identify the set of characteristics related to plants belonging to family Fabaceae from the following :

(1) Actinomorphic flower, syncarpous ovary and marginal placentation
(2) Persistent calyx, epipetalous stamens and leguminous fruit
(3) Papilionaceous corolla, axile placentation and leguminous fruit
(4) Vexillary aestivation of corolla, diadelphous stamens and monocarpellary, unilocular ovary

22. One of the following statements is incorrect with reference to biodiversity. Identify it.

(1) Biodiversity increases from higher altitudes to lower altitudes.
(2) Depletion in genetic diversity of crop plants is mainly due to the introduction of better varieties with high yield, disease resistance, etc.
(3) The richest reservoirs of animal and plant life (species richness) with few or no threatened species are called "biodiversity hotspots".
(4) Biodiversity decreases from the equator to polar regions.

Space For Rough Work

23. In castor and maize plants, _____.

(1) autogamy is prevented but not geitonogamy

(2) both autogamy and geitonogamy are prevented

(3) male and female flowers are borne by different plants

(4) the anthers and stigma are placed at different positions to encourage cross pollination

24. In garden pea, round shape of seeds is dominant over wrinkled shape. A pea plant heterozygous for round shape of seed is selfed and 1600 seeds produced during the cross are subsequently germinated. How many seedlings would have the parental phenotype ?

(1) 1600 (2) 800

(3) 400 (4) 1200

25. Which of the following events would occur in 'Lac-operon' of *E. coli* when the growth medium has high concentration of lactose ?

(1) The structural genes fail to produce polycistronic mRNA.

(2) The repressor protein binds to RNA polymerase and prevents translation.

(3) The repressor protein attaches to the promoter sequence and derepresses the operator.

(4) The inducer molecule binds to repressor protein and RNA polymerase binds to promoter sequence.

26. The mature infective stages of malarial parasite which are transferred from mosquito to man are _____.

(1) Sporozoites (2) Merozoites

(3) Trophozoites (4) Gametocytes

27. One of the following refers to Allen's rule :

(1) If the stressful conditions are localized or remain only for a short duration, an organism either migrates or suspends itself.

(2) Mammals from colder climates have shorter ears and limbs to minimize heat loss.

(3) An organism can move from a stressful habitat to a more hospitable area and return when the stressful period is over.

(4) Low atmospheric pressure in higher altitudes results in altitude sickness.

Space For Rough Work

28. Identify the DNA segment which is not a palindromic sequence :

(1) 5′ GAATTC 3′
3′ CTTAAG 5′

(2) 5′ CCCGGG 3′
3′ GGGCCC 5′

(3) 5′ GGATCC 3′
3′ GGTACC 5′

(4) 5′ GCGGCCGC 3′
3′ CGCCGGCG 5′

29. During somatic hybridization in plants, _____.

(1) somaclones are produced in large numbers
(2) the apical meristems are cultured to get virus-free plants
(3) the cell walls and the middle lamella are digested before fusing the cells
(4) crop plants with higher levels of vitamins, proteins and minerals are hybridised

30. **Statement A :** The secretion of collaterial gland forms the egg case in cockroach.
Statement B : The development in cockroach is hemimetabolous.

(1) Both the statements A and B are correct and B is the reason for A.
(2) Both the statements A and B are correct and B is not the reason for A.
(3) Statement A is correct and statement B is wrong.
(4) Statement B is correct and statement A is wrong.

31. If a plant produces flowers when exposed only to alternating periods of 5 hours light and 3 hours dark in a 24 – hour cycle, then the plant should be a _____.

(1) Short day plant (2) Long day plant
(3) Short–long day plant (4) Day neutral plant

32. If there was no carbon dioxide in the earth's atmosphere, the temperature of the earth's surface would be _____.

(1) same as the present level
(2) more than the present level
(3) less than the present level
(4) dependent on the oxygen content in the atmosphere

Space For Rough Work

33. One of the following is incorrect about cancer cells :

(1) They exhibit the property of contact inhibition.

(2) They are metastatic.

(3) They exhibit mass proliferation.

(4) They are produced when cellular oncogenes of normal cells are activated.

34. The centrosome duplicates during the _____.

(1) S – phase of cell cycle (2) G_1 – phase of cell cycle

(3) G_2 – phase of cell cycle (4) Prophase of cell cycle

35. Match the items listed under Column-I with those given under Column-II; choose the appropriate option from the given choices.

	Column – I		Column – II
A.	Residual Volume (RV)	P.	4000 ml – 4600 ml
B.	Inspiratory Reserve Volume (IRV)	Q.	1100 ml – 1200 ml
C.	Vital Capacity (VC)	R.	1000 ml – 1100 ml
D.	Expiratory Reserve Volume (ERV)	S.	3000 ml – 3500 ml
E.	Inspiratory Capacity (IC)	T.	2500 ml – 3000 ml

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

36. Which of the following statements is correct ?

(1) Elaioplasts store starch whereas aleuroplasts store proteins.

(2) Acrocentric chromosomes have only one arm.

(3) The core of cilium or flagellum is the basal body.

(4) Membranous extensions into the cytoplasm in cyanobacteria which contain pigments are called chromatophores.

Space For Rough Work

37. Sickle cell anaemia is caused due to the substitution of _____.

(1) Valine at the 6th position of alpha globin chain by glutamic acid

(2) Glutamic acid at the 6th position of beta globin chain by valine

(3) Valine at the 6th position of beta globin chain by glutamine

(4) Glycine at the 6th position of alpha globin chain by glutamic acid

38. **Statement A :** The primary transcript produced in eukaryotes is translated without undergoing any modification or processing.

Statement B : The hnRNA in humans has exons and introns.

(1) Both the statements A and B are correct.

(2) Both the statements A and B are wrong.

(3) Statement B is correct and statement A is wrong.

(4) Statement A is correct and statement B is wrong.

39. Knee joint is an example for _____.

(1) Ball and socket joint (2) Hinge joint

(3) Pivot joint (4) Gliding joint

40. Carefully read the following reactions carried out by nitrogen fixing bacteria. Identify the statement about these equations which is not true :

$2NH_3 + 3O_2 \rightarrow 2NO_2^- + 2H^+ + 2H_2O$ .....(A)

$2NO_2^- + O_2 \rightarrow 2NO_3^-$ .....(B)

(1) Step (A) is carried out by *Nitrosomonas* or *Nitrococcus*.

(2) Step (B) is carried out by *Nitrobacter*.

(3) Both the steps (A) and (B) can be called nitrification.

(4) Both the steps occur only in photoautotrophs.

Space For Rough Work

41. Match the vegetative propagules listed under Column-I with the plants given under Column-II; choose the appropriate option from the given choices.

Column – I		Column – II
A. Rhizome	p.	*Agave*
B. Offset	q.	*Bryophyllum*
C. Sucker	r.	Ginger
D. Leaf buds	s.	*Chrysanthemum*
	t.	*Eichhornia*

(1) A-r, B-s, C-p, D-q
(2) A-s, B-t, C-q, D-r
(3) A-r, B-t, C-s, D-q
(4) A-q, B-p, C-t, D-s

42. One of the following causes population explosion :
(1) Decrease in death rate, maternal mortality rate and infant mortality rate
(2) Decrease in death rate and increase in maternal mortality rate
(3) Decrease in infant mortality rate and increase in death rate
(4) Decrease in infant mortality rate and decrease in the number of people in reproductive age

43. _____ are the most abundant proteins in the living world.
(1) Ribozyme of plants and collagen of animals
(2) RuBisCO of plants and collagen of animals
(3) PEPcase of plants and keratin of animals
(4) Alcohol dehydrogenase of plants and melanin of animals

44. One of the chief reasons among the following for the depletion in the number of species making it endangered is _____.
(1) Greenhouse effect (2) Habitat destruction
(3) Over-hunting and poaching (4) Competition and predation

Space For Rough Work

45. In humans, what is the ratio of number of gametes produced from one male primary sex cell to the number of gametes produced from one female primary sex cell ?

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

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

46. Identify the incorrect statement from the following :

(1) Pyramid of energy is mostly upright, but sometimes it may be inverted.

(2) Pyramids of number and biomass may be either upright or inverted.

(3) Pyramid of biomass in sea is generally inverted as the biomass of fish far exceeds that of phytoplanktons.

(4) Food chains are generally short with few trophic levels as only 10% of the energy is transferred to each trophic level from the lower trophic level.

47. Match the organic compounds listed under Column-I with the explanation given under Column-II; choose the appropriate option from the given choices.

	Column – I		Column – II
A.	Phosphoenol pyruvate (PEP)	p.	6 – carbon compound
B.	Ribulose biphosphate (RuBP)	q.	2 – carbon compound
C.	Oxaloacetic acid (OAA)	r.	4 – carbon compound
D.	Acetyl co-enzyme – A	s.	5 – carbon compound
		t.	3 – carbon compound

(1) A-r, B-s, C-t, D-p

(2) A-q, B-r, C-s, D-t

(3) A-t, B-s, C-r, D-q

(4) A-t, B-p, C-q, D-r

48. Down's syndrome is an example for _____.

(1) Aneuploidy of sex chromosome

(2) Aneuploidy of autosome

(3) Syndrome caused due to gene mutation

(4) Loss of one sex – chromosome from the diploid set

Space For Rough Work

49. The interaction between the organisms of one of the following pairs is an example for commensalism :

(1) Wasps and fig tree (2) Cuckoo and crow

(3) Cattle or sheep and grass (4) Orchid and mango tree

50. The germ pores in the pollen grain are the regions _____.

(1) That can withstand high temperature and strong acids and alkalies

(2) Through which sperms are released into the female gametophyte

(3) Which are made up of lignin and suberin

(4) Which lack sporopollenin

51. Heroin is _____.

(1) A cannabinoid

(2) Diacetylmorphine (chemically)

(3) Commonly called 'coke' or 'crack'

(4) Used to treat mental illnesses like depression and insomnia

52. Thorns of *Bougainvillea* and tendrils of *Cucurbita* are examples for _____.

(1) Convergent evolution (2) Divergent evolution

(3) Adaptive radiation (4) Co-evolution

53. Some of the steps of DNA fingerprinting are given below. Identify the correct sequence from the options given :

A. Electrophoresis of DNA fragments

B. Hybridisation with DNA probe

C. Digestion of DNA by RENs

D. Autoradiography

E. Blotting of DNA fragments to nitrocellulose membrane

(1) C – A – E – B – D

(2) A – C – E – D – B

(3) C – A – B – E – D

(4) A – E – C – B – D

Space For Rough Work

54. 'Flocks' is _____.

(1) The primary sludge produced in sewage treatment

(2) A type of biofortified food

(3) A mesh-like structure formed by the association of bacteria and fungal filaments in sewage treatment

(4) The effluent in primary treatment tank obtained during sewage treatment

55. ADA deficiency results in _____.

(1) Increased risk of infertility

(2) Inability of the immune system to function normally

(3) Chromosomal disorders

(4) Decrease in the yield of crop plants

56. Parbhani kranti, a variety of bhindi (lady's finger), is resistant to _____.

(1) Bacterial blight (2) Yellow mosaic virus

(3) Black rot (4) Leaf curl

57. The globular head of myosin contains _____.

(1) Calcium ions in large quantities

(2) Troponin

(3) ATPase enzyme

(4) ATP

58. EcoRI is _____.

(1) a restriction enzyme

(2) a plasmid

(3) used to join two DNA fragments

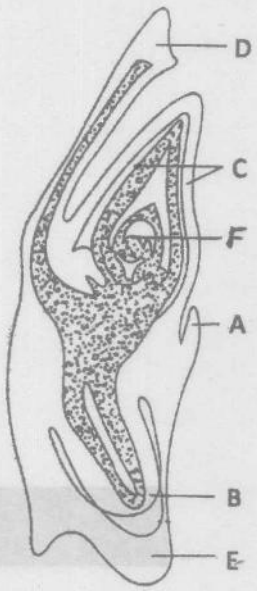
(4) the abbreviation for bacterium *Escherichia coli*

Space For Rough Work

59. 'Roquefort cheese' is ripened by using a _____.

(1) Type of yeast
(2) Fungus
(3) Bacterium
(4) Cyanobacteria

60. In this diagram showing the L.S. of an embryo of grass, identify the answer having the correct combination of alphabets with the right part :



(1) A – Root cap, B – Coleoptile, C – Scutellum, D – Coleorhiza, E – Epiblast, F – Shoot apex

(2) A – Shoot apex, B – Epiblast, C – Coleorhiza, D – Scutellum, E – Coleoptile, F – Radicle

(3) A – Epiblast, B – Scutellum, C – Coleoptile, D – Radicle, E – Coleorhiza, F – Shoot apex

(4) A – Epiblast, B – Radicle, C – Coleoptile, D – Scutellum, E – Coleorhiza, F – Shoot apex

Space For Rough Work

A-1

SEAL