# JIPMER Question Paper 2018

**Duration : 2 : 30 Hrs**

| Exam | | Total Questions | | | |
|---|---|---|---|---|---|
| JIPMER | | 200 | | | |
| Marks for Correct Answer | Negative Marks | Physics | Chemistry | Biology | English |
| 4 | 1 | 60 | 60 | 60 | 20 |

## Physics

1. The angle between two linear transmembrane domains is defined by following vectors
$\mathbf{a} = \hat{\mathbf{i}} + \hat{\mathbf{j}} - \hat{\mathbf{k}}$ and $\mathbf{b} = \hat{\mathbf{i}} - \hat{\mathbf{j}} + \hat{\mathbf{k}}$
(a) $\cos^{-1}\left(\frac{1}{3}\right)$
(b) $\cos^{-1}\left(\frac{-1}{3}\right)$
(c) $\sin^{-1}\left(\frac{-1}{3}\right)$
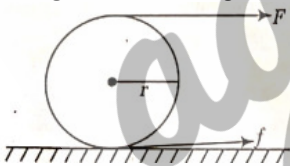(d) $\sin^{-1}\left(\frac{1}{3}\right)$

Correct: b

2. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$ where a, b, $\alpha$ and $\beta$ are positive constants. The velocity of the particle will
(a) decrease with time
(b) be independent of $\alpha$ and $\beta$
(c) drop to zero when $\alpha = \beta$
(d) increase with time

Correct: d

3. A tangential force acting on the top of sphere of mass m kept on a rough horizontal place as shown in figure.



If the sphere rolls without slipping, then the acceleration with which the centre of sphere moves, is
(a) $\frac{10F}{7m}$
(b) $\frac{F}{2m}$
(c) $\frac{3F}{7m}$
(d) $\frac{7F}{2m}$

Correct: a

4. The density of a rod having length / varies as $\rho = c + dx$ , where x is the distance from the left ond. The centre of mass is



(a) $\frac{3cl+2Dl^2}{3(2c+Dl)}$
(b) $\frac{2cl+3Df^2}{2(4c+8l)}$
(c) $\frac{2cl+3D^\beta}{3(2c+l)}$

(d) $\frac{cl+Df^2}{3(2c+D)}$

Correct: a

5. One end of a massless spring of constant 100 N/m and natural length 0.5 m is fixed and the other end is connected to a particle of mass 0.5 kg lying on a frictionless horizontal table. The spring remains horizontal. If the mass is made to rotate al angular velocity of 2 rad/s, then elongation of spring is
(a) 0.1 m
(b) 10 cm
(c) 1 cm
(d) 0.01 cm

Correct: c

6. A body is projected vertically upwards. The times corresponding to height h while ascending and while descending are respectively , Then, the velocity of projection will be (take g as acceleration due to gravity)
(a) $\frac{g\sqrt{t_1 t_2}}{2}$
(b) $\frac{g(t_1+t_2)}{2}$
(c) $g\sqrt{t_1 t_2}$
(d) $g\frac{t_1 t_2}{(t_1+t_2)}$

Correct: b

7. Two long straight wires, each carrying an electric current of 5 A, are kept parallel to each other at a separation of 2.5 cm. Find the magnitude of the magnetic force experiment by 10 cm of a wire.
(a) $40 \times 10^{-4}$N
(b) $3.5 \times 10^{-6}$N
(c) $20 \times 10^{-5}$N
(d) $20 \times 10^{-9}$N

Correct: c

8. A wire of resistance $10\Omega$ is bent to form a complete circle. Find its resistance between two diametrically opposite point.
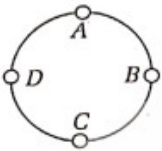


(a) $5\Omega$
(b) $2.5\Omega$
(c) $1.25\Omega$
(d) $\frac{10}{3}\Omega$

Correct: b

9. Find the resistance of a hollow cylindrical conductor of length 1.0 mm and 2.0 mm respectively. The resistivity of the material is $2.0 \times 10^{-8}\Omega$m
(a) $2.1 \times 10^{-3}\Omega$
(b) $1.3 \times 10^{-4}\Omega$
(c) $3.2 \times 10^{-4}\Omega$
(d) $4.6 \times 10^{-2}\Omega$

Correct: a

10. N lamps each of resistance r, are fed by a machine of resistance R. If light emitted by any lamp is proportional to the square of the heat produced, prove that the most efficient way of arranging them is to place them in parallel arcs, each containing n lamps, where n is the integer
(a) $\left(\frac{r}{NR}\right)^{3/2}$
(b) $\left(\frac{NR}{r}\right)^{1/2}$
(c) $(NRr)^{3/2}$
(d) $(NRr)^{1/2}$

Correct: b

11. A diatomic gas $(\gamma = 1.4)$ does 200 J of work when it is expanded isobarically. Find the heat given to the gas in the process.

(a) 500 J

(b) 700 J

(c) 600 J

(d) 900 J

Correct: b

12. A uniform ring of mass m and radius a is placed directly above a uniform sphere of mass m and of equal to radius. The centre of the ring is at a distance 3 a from the centre of the sphere. The gravitational force (F) exerted by the sphere on the ring is

(a) $\frac{3GMm}{8a^2}$

(b) $\frac{2GMm}{3a^2}$

(c) $\frac{7GMm}{\sqrt{2}a^2}$

(d) None of these

Correct: a

13. A projectile is fired with a velocity u at angle with the ground surface. During the motion at any time it is making an angle a with the ground surface. The speed of particle at this time will be

(a) $u \cos\theta \sec\alpha$

(b) $u \cos\theta \cdot \tan\alpha$

(c) $u^2 \cos^2\alpha \sin^2\alpha$

(d) $u \sin\theta \cdot \sin\alpha$

Correct: a

14. The earth receives solar radiation at a rate of $8.2 \mathrm{Jcm}^{-2}\mathrm{min}^{-1}$ If the sun radiates as the black bodies, the temperature at the surface of the sun will be the angle subtended by sun on the earth in suppose 0.53° and Stefan constant is $\sigma = 5.67 \times 10^{-8}\mathrm{Wm}^{-2}\mathrm{K}^4$)

(a) 5800 K

(b) 6700 K

(c) 8000 K

(d) 7800 K

Correct: a

15. A skier starts from rest at point A and slides down the hill without turning or breaking. The friction coefficient is u. When he stops at point B, his horizontal displacement is S. What is the height difference between points A and B?

(The velocity of the skier is small so that the additional pressure on the snow due to the curvature can be neglected. Neglect also the friction of air and the dependence of u on the velocity of the skier.)

(a) $h = \mu S$

(b) $h = \frac{\mu}{S}$

(c) $h = 2\mu S$

(d) $h = \mu S^2$

Correct: a

16. A horizontal tube of length 1 closed at both ends, contains an ideal gas of molecular weight M. The tube is rotated at a constant angular velocity $\omega$ about a vertical axis passing through an end. Assuming the temperature to be uniform and constant. If $p_1$ and $p_2$ denote the pressure at free and the fixed end respectively, then choose the correct relation.

(a) $\frac{p_2}{p_1} = e^{\frac{M\omega^2 f^2}{2RT}}$

(b) $\frac{p_1}{p_2} = e^{\frac{M\omega v^2}{RI}}$

(c) $\frac{p_1}{p_2} = e^{\frac{\omega M}{3RT}}$

(d) $\frac{p_2}{p_1} = e^{\frac{M^2\omega^2 l^2}{3RT}}$

Correct: a

17. The parts of two concentric circular arcs joined by two radial lines and carries current i. The arcs subtend an angle $\theta$ at the centre of the circle. The magnetic field at the centre 0, is

(a) $\frac{\mu_0 i(b-a)\theta}{4\pi ab}$

(b) $\frac{\mu_0 i(b-a)}{(\pi-\theta)}$

(c) $\frac{\mu_0 i(b-a)\theta}{\pi ab}$

(d) $\frac{\mu_0 i(a-b)}{2\pi ab}$

Correct: a

18. 1 kg of water is converted into steam at the same temperature and at 1 atm (100 kPa). The density of water and steam are $1000 \mathrm{kgm}^{-3}$ and $0.6 \mathrm{kgm}^{-3}$ respectively. The latent heat of vaporisation of water is $2.25 \times 10^6 \mathrm{Jkg}^{-1}$ What will be increase in energy?
(a) $3 \times 10^5 \mathrm{J}$
(b) $4 \times 10^6 J$
(c) $2.08 \times 10^6 J$
(d) None of these

Correct: c

19. The ammeter shown in figure consists of a $480\Omega$ coil connected in parallel to a $20\Omega$ shunt. The reading of ammeter is
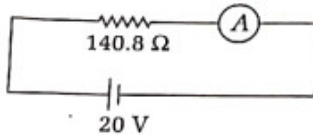


(a) 0.125A
(b) 1.67A
(c) 0.13A
(d) 0.67A

Correct: a

20. A lead ball at 30°C is dropped from a height of 6.2 km. The ball is heated due to the air resistance and it completely melts just before reaching the ground. The molten substance falls slowly on the ground. If the specific heat of lead $= 126 \mathrm{Jkg}^{-1}\mathrm{C}^{-1}$ and melting point of lead $= 130°$C and suppose that any mechanical energy lost is used to heat the ball, then the latent heat of fusion of lead is
(a) $2.4 \times 10^4 \mathrm{Jkq}^{-1}$
(b) $3.6 \times 10^4 \mathrm{Jkg}^{-1}$
(c) $7.6 \times 10^2 \mathrm{Jkg}^{-1}$
(d) $4.2 \times 10^3 \mathrm{Jkg}^{-1}$

Correct: a

21. An inductor (L = 20 H), a resistor (R = $(R = 100\Omega)$) and a battery (E = 10 V) are connected in series. After a long time, the circuit is short-circuited and then the battery is disconnected. Find the current in the circuit at 1 ms after short circuiting.
(a) $4.5 \times 10^5 \mathrm{A}$
(b) $3.2 \times 10^{-5} \mathrm{A}$
(c) $9.8 \times 10^{-5} \mathrm{A}$
(d) $6.7 \times 10^{-4} \mathrm{A}$

Correct: d

22. Two charges of $+10\mu C$ and $+ 20\mu C$ are separated by a distance 2 cm. The net potential (electric) due to the pair at the middle point of the line joining the two changes, is
(a) 27 MV
(b) 18 MV
(c) 20 MV
(d) 23 MV

Correct: a

23. A light string passes over a frictionless pulley. To one of its ends a mass of 8 kg is attached. To its other end two masses of 7 kg each are attached. The acceleration of the system will be
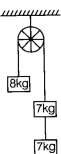


(a) 10.2 g
(b) 5.10 g
(c) 20.36 g
(d) 0.27 g

Correct: d

24. A particle is subjected to two simple harmonic motions along X-axis while other is along a line making angle 45° with the X-axis. The two motions are given by $x = x_0 \sin \cos t$ and $s = s_0 \sin \omega t$ .The amplitude of resultant motion is

(a) $x_0 + s_0 + 2x_0 s_0$

(b) $\sqrt{x_0^2 + s_0^2}$

(c) $\sqrt{x_0^2 - s_0^2 + 2x_0 s_0}$

(d) $\left[ x_0^2 + s_0^2 + \sqrt{2} x_0 s_0 \right]^{1/2}$

Correct: d

25. What is the change in the volume of 1.0 L kerosene, when it is subjected to an extra pressure of $2.0 \times 10^5 \text{Nm}^{-2}$ from the following data? Density of kerosene $= 800 \text{kgm}^{-3}$ and speed of sound in kerosene $= 1330 \text{ms}^{-1}$

(a) $0.97 \text{cm}^{-3}$

(b) $0.66 \text{cm}^{-3}$

(c) $0.15 \text{cm}^{-3}$

(d) $0.59 \text{cm}^{-3}$

Correct: c

26. A 4 kg block is suspended from the ceiling of an elevator through a spring having a linear mass density of $19.2 \times 10^{-3} \text{kgm}^{-3}$. Find the speed with respect to spring with which a wave pulse can proceed on the spring if the elevator accelerates up at the rate of $2.0 \text{ms}^{-2}$? Take $g = 10 \text{ms}^{-2}$

(a) 30 m/s

(b) 42 m/s

(c) 46 m/s

(d) 50 m/s

Correct: d

27. The lower end of capillary tube is immersed in mercury. The level of mercury in the tube is found to be 2 cm below the outer level. If the same tube is immersed in water, upto what height will the water rise in the capillary?

(a) 5.9

(b) 4.9

(c) 2.9

(d) 1.9

Correct: c

28. Mercury boils at 367°C. However, mercury thermometers are made such that they can measure temperature upto 500°C. This is done by

(a) maintaining vacuum aboves mercury column in the stem of the thermometer.

(b) filling nitrogen gas at high pressure above the mercury column.

(c) filling oxygen gas at high pressure above the mercury column.

(d) filling nitrogen gas at low pressure above the mercury column.

Correct: b

29. Water level is maintained in a cylindrical vessel up to a fixed height H. The vessel is kept on a horizontal plane. At what height above the bottom should a hole be made in the vessel, so that the water stream coming out of the hole strikes the horizontal plane of the greatest distance from the vessel?
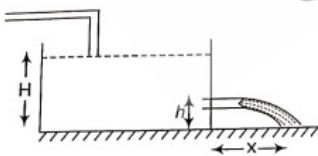


(a) $h = \frac{H}{2}$

(b) $h = \frac{3H}{2}$

(c) $h = \frac{2H}{3}$

(d) $h = \frac{3}{4}H$

Correct: a

30. Figure shows spring + block + pulley system which are light. The time period of mass would be
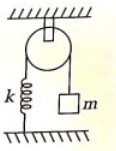
(a) $2\pi\sqrt{\frac{k}{m}}$

(b) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$

(c) $2\pi\sqrt{\frac{m}{k}}$

(d) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$

Correct: c

31. A pendulum having a bob of mass m is hanging in a ship sailing along the equator from east to west. When the strip is stationary with respect to water, the tension in the string is $T_0$ The difference between $T_0$ and earth attraction on the bob, is

(a) $\frac{mg+m\omega^2 R}{2}$

(b) $\frac{m\omega^2 R}{3}$

(c) $\frac{m\omega^2 R}{2}$

(d) $m\omega^2 R$

Correct: d

32. A solid sphere is set into motion on a rough horizontal surface with a linear speed v in the forward direction and an angular speed v/R in the anticlockwise direction as shown in figure. Find the linear speed of the sphere when it stops rotating and $(u) = \frac{v}{R}$
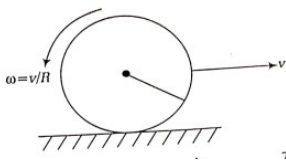


(a) $\frac{3v}{5}$

(b) $\frac{2v}{5}$

(c) $\frac{4v}{3}$

(d) $\frac{7v}{3}$

Correct: a

33. Two blocks of masses $m_1$ and $m_2$ are connected by a spring of spring constant k. The block of mass $m_2$ is given a sharp empulse so that it acquires a velocity vo towards right. Find the maximum elongation that the spring will suffer.



(a) $\left[\frac{m_1 m_2}{m_1+m_2}\right]^{\frac{1}{2}} v_0$

(b) $\left(\frac{m_1+m_2}{m_1-m_2}\right) v_0$

(c) $\left[\frac{m_1+m_2}{m_1-m_2}\right]^{\frac{1}{2}} v_0$

(d) $\left[\frac{2m_1+m_2}{m_1 m_2}\right]^{\frac{1}{2}} v_0$

Correct: a

34. A charged particle 'q' is shot with speed v towards another fixed charged particle Q. It approaches Q upto a closest distance r and then returns. If q were given a speed 2v, the closest distance of approach would be
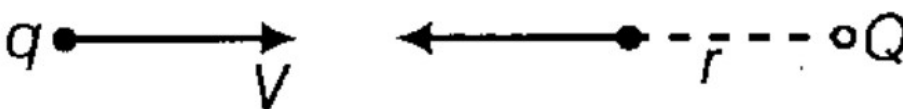


(a) r

(b) 2r

(c) r/2

(d) r/4

Correct: a

35. A particle slides on surface of a fixed smooth sphere starting from topmost point. The angle rotated by the radius through the particle, when it leaves contact with the sphere, is

(a) $\theta = \cos^{-1}\left(\frac{1}{3}\right)$

(b) $\theta = \cos^{-1}\left(\frac{2}{3}\right)$

(c) $\theta = \tan^{-1}\left(\frac{1}{3}\right)$

(d) $\theta = \sin^{-1}\left(\frac{4}{3}\right)$

Correct: b

36. What is the radius of curvature of the parabola traced out by the projectile in the previous problem at a point where the particle velocity makes an angle $\frac{\theta}{2}$ with the horizontal?

(a) $r = \frac{v^2 \cos^2 \theta}{g \cos^2 \frac{\theta}{2}}$

(b) $r = \frac{2v \sin 0}{g \tan \theta}$

(c) $r = \frac{v \cos \theta}{g \sin^2 \frac{\theta}{2}}$

(d) $r = \frac{3v \cos \theta}{g \cot \theta}$

Correct: a

37. A block of mass 2 kg is pushed against a rough vertical wall with a force of 40 N, coefficient of static friction being 0.5. Another horizontal force of 15 N, is applied on the block in a direction parallel to the wall. If the block will move, then its direction would be

(a) $15°$ with 15N

(b) $53°$ with 15N

(c) $45°$ with 15N

(d) $75°$ with 15N

Correct: b

38. A block is kept on the floor of an elevator at rest. The elevator starts descending with an acceleration of 12 $m/s^2$. Find the displacement of the block during the first 0.2 s after the start. (Take, $g = 10m/s^2$) )
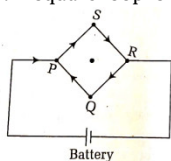
(a) 30 cm

(b) zero

(c) 20 cm

(d) 25 cm

Correct: c

39. A monkey of mass 15 kg is climbing on a rope with one end fixed to the ceiling. If it wishes to go up with an acceleration $1m/s^2$, how much force should it apply to the rope if rope is 5 m long and the monkey starts from rest?

(a) 150 N

(b) > 160 N

(c) 165 N

(d) $150 < T \leq 160$N

Correct: c

40. A square loop is made by a uniform conductor wire as shown in figure


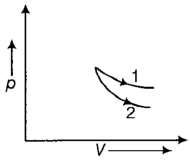
The net magnetic field at the centre of the loop if side length of the square is a

(a) $\frac{\mu_0'}{2a}$

(b) zero

(c) $\frac{\mu_0 i^2}{a^2}$

(d) None of these

Correct: b

41. p-V plots for two gases during adiabatic process as shown in figure plots 1 and 2 should correspond respectively to



(a) He and $O_2$
(b) $O_2$ and He
(c) $He$ and $Ar$
(d) $O_2$ and $N_2$

Correct: b

42. Two small balls, each carrying a charge q are suspended by equal insulator strings of length l m from the hook of a stand. This arrangement is carried in a satellite in space. The tension in each string will be

(a) $\frac{1}{4\pi\varepsilon_0}\frac{q}{l^2}$
(b) $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{4l^2}$
(c) $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{j^2}$
(d) $\frac{1}{(4\pi\varepsilon_0)}\frac{q}{l}$

Correct: b

43. A vessel of depth t is half filled with a liquid having refractive index $n_1$ and the other half is filled with water of having refractive index $n_2$ .The apparent depth of the vessel as viewed from top is

(a) $\frac{2t(n_1+n_2)}{n_1 n_2}$
(b) $\frac{t n_1 n_2}{(n_1+n_2)}$
(c) $\frac{t(n_1+n_2)}{2n_1 n_2}$
(d) $\frac{n_1 n_2}{(n_1+n_2)t}$

Correct: c

44. In photoelectric effect, the number of photo-electrons emitted is proportional to
(a) velocity of incident beam
(b) frequency of incident beam
(c) intensity of incident beam
(d) work function for cathode material

Correct: c

45. A change of 8.0 mA in the emitter current brings a change of 7.9 mA in the collector current. The value of a will be
(a) 0.96
(b) 0.93
(c) 0.90
(d) 0.99

Correct: d

46. The half-life of $^{198}Au$ is 2.7 days. The average life is
(a) 4 days
(b) 3.4 days
(c) 3.9 days
(d) None of the above

Correct: c

47. The do-Broglie wavelength of electron falling on the target in an X-ray tube is 2. The cut-off wavelength of the emitted X-ray is
(a) $\lambda_0 = \frac{(mc\lambda)^2}{h}$
(b) $\lambda_0 = \frac{m^2 c\lambda}{h^2}$
(c) $\lambda_0 = \frac{2mc\lambda^2}{h}$
(d) $\lambda_0 = \frac{mc\lambda^2}{h^2}$

Correct: c

48. If $M_O$ is the mass of an oxygen isotope $_8O^{17}$ $M_p$ and $M_n$ are the masses of a proton and a neutron, respectively, the nuclear binding energy of the isotope is
(a) $M_0 c^2$
(b) $(M_O - 17M_n)\,c^2$
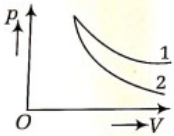(c) $(M_0 - 8M_p)\,c^2$
(d) $(8M_p + 9M_n - M_0)$

Correct: d

49. A nucleus disintegrates into two nuclear parts which have their velocities in the ratio 2:1. The ratio of their nuclear size will be
(a) $2^{1/3} : 1$
(b) $1; 3^{1/2}$
(c) $3^{1/2} : 1$
(d) $1 : 2^{1/3}$

Correct: d

50. The given p-V diagram shows gases during adiabatic process. Plots 1 and 2 should correspond respectively to



(a) He and $O_2$
(b) $O_2$ and He
(c) He and Ar
(d) $O_2$ and $N_2$

Correct: a

51. For an adiabatic expansion of a mono atomic perfect gas, the volume increases by 24%. What is the percentage decrease in pressure?
(a) 24%
(b) 40%
(c) 48%
(d) 71%

Correct: b

52. A body weighing 8 g when placed in one pan and 18 g when placed on the other pan of a false balance. If the beam is horizontal when both the pans are empty, then the true weight of the body is
(a) 13 g
(b) 9 g
(c) 22 g
(d) 12 g

Correct: d

53. A rod PQ of length 1 is moving with ends remaining in contact with frictionless wall and floor. If at the instant, shown the velocity of end Q is 2 m/s towards negative direction of x. The speed of end P will be
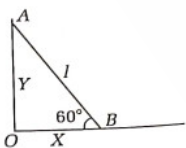


(a) $\sqrt{3}\,\mathrm{ms}^{-1}$
(b) $\frac{2}{\sqrt{3}}\,ms^{-1}$
(c) $\sqrt{2}\,\mathrm{ms}^{-1}$
(d) $\frac{\sqrt{5}}{2}\,\mathrm{ms}^{-1}$

Correct: b

54. Universal time is based on
(a) rotational effect of the earth about its axis
(b) vibrations of cesium atom
(c) orbital motion of the earth around the sun
(d) oscillation of quartz crystal

Correct: a

55. A photo cell is illuminated by a small bright source placed im away. When the same source of light is placed 2m away, the electrons emitted by photo cathode
(a) carry one quarter of their previous energy
(b) carry one quarter of their previous momenta
(c) are half as numerous
(d) are one quarter as numerous

Correct: d

56. Two rigid boxes containing different ideal gases are placed on table. Box A contains one mole of nitrogen at temperature To, while box B contains 1 mole of helium at temperature $T_0$. The boxes are then put into thermal contact with each other and heat flows between them until the gases reach a common final temperature (ignore the heat capacity of boxes) then the final temperature of gases, $T_f$ in terms of $T_0$ is
(a) $\frac{2T_0}{5}$
(b) $\frac{3T_0}{7}$
(c) $\frac{5T_0}{3}$
(d) $\frac{9T_0}{7}$

Correct: c

57. The temperature of the cold junction of thermocouple is 0°C and the temperature of a hot junction is T°C The emf is $E = 16T - 0.04T^2 \quad \mu V$. The inversion temperature $T_i$ is
(a) 300°C
(b) 200°C
(c) 500°C
(c) 400°C

Correct: d

58. The galvanometer resistance is $30\Omega$ and it is connected to 2 V battery along with a resistance $2000\Omega$ in series. A full scale deflection of 25 divisions is obtained. In order to reduce this deflection to 20 divisions, the resistance in series should be
(a) $2470\Omega$
(b) $2320\Omega$
(c) $2180\Omega$
(d) $2210\Omega$

Correct: a

59. A thin bar magnet of length 2 L is bent at the mid-point so that the angle between them is 60. The new length of the magnetis
(a) $\frac{L}{2\sqrt{3}}$
(b) $\frac{\sqrt{3}x}{2}$
(c) L
(d) $\frac{2L}{3}$

Correct: c

60. The magnetic flux through each turn of a coil having 200 turns is given as $(t^2 - z) \times 10^{-3}$Wb where t is in second. The emf induced in the coil at t = 3 s is
(a) 0.7 V
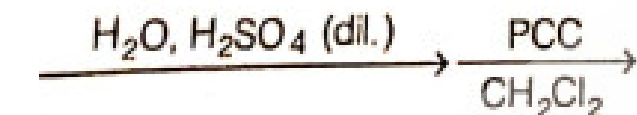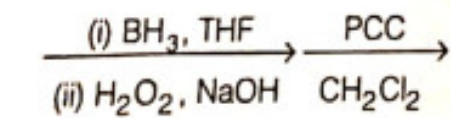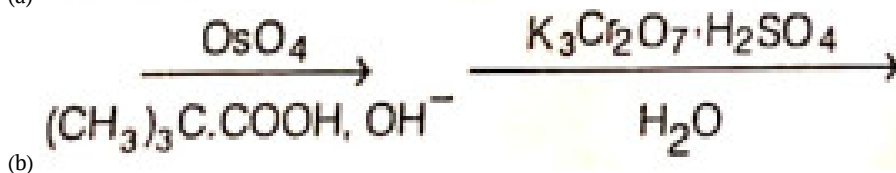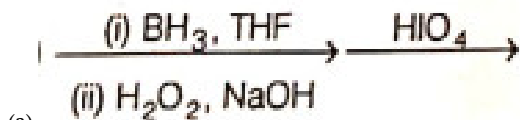(b) 1.2 V
(c) 0.8 V
(d) 0.9 V

Correct: c

## Chemistry

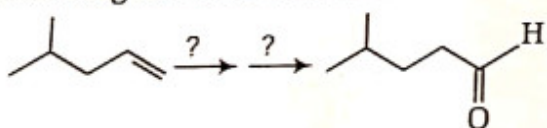61. The compressibility of a gas is less than unity at STP, therefore
(a) $V_m > 22.4$L
(b) $V_m < 22.4$L
(c) $V_m = 22.4$L

(d) $V_m = 44.8 L$

Correct: b

62. The suitable reaction steps to carry out the following transformation is



(a)
$$\xrightarrow[\text{(ii) } H_2O_2, \text{ NaOH}]{\text{(i) } BH_3, \text{ THF}} \xrightarrow{HIO_4}$$

(b)
$$\xrightarrow[(CH_3)_3C.COOH, \text{ OH}^-]{OsO_4} \xrightarrow[H_2O]{K_3Cr_2O_7 \cdot H_2SO_4}$$

(c)
$$\xrightarrow[\text{(ii) } H_2O_2, \text{ NaOH}]{\text{(i) } BH_3, \text{ THF}} \xrightarrow[CH_2Cl_2]{PCC}$$

(d)
$$\xrightarrow{H_2O, H_2SO_4 \text{ (dil.)}} \xrightarrow[CH_2Cl_2]{PCC}$$

Correct: d

63.
$$SF_4 \xrightarrow{\text{Hydrolysis}} X + Y$$
$$X + H_2S \longrightarrow Z$$

Here, Z is
(a) $SO_3$
(b) coloida super
(c) gaseous sulphur
(d) solid sulphur

Correct: b

64. For preparing 3.00 L of 1M NaOH by mixing portions of two stock solutions (A and B) of 2.50 M NaOH and 0.40 M NaOH respectively. Find out the amount of B stock solution (in L) added.
(a) 8.57L
(b) 2.14 L
(c) 1.28 L
(d) 7.51 L

Correct: b

65. Sodium sulphite is used in preserving squashes and other mildly acidic foods due to
(a) potassium salt has preservative action
(b) potassium metabisulphite prevents oxidation
(c) potassium metabisulphite is not influenced by acid
(d) sulphur dioxide and sulphurous acid formed kill bacteria and germs 6.

Correct: a

66. The Vividh Bharti Station of All India Radio, Delhi, broadcasts on a frequency of 1,368kHz (Kilohertz). Calculate the wavelength (λ) of the electromagnetic radiation emitted by transmitter. Which part of the electromagnetic spectrum does it belong to?

(a) 319.4 m and X-rays
(b) 319.4 m and radiowave
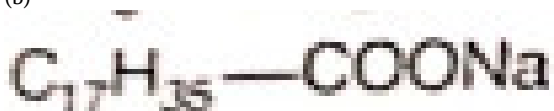(c) 219.3 m and microwave
(d) 219.3 m and radiowave

Correct: b

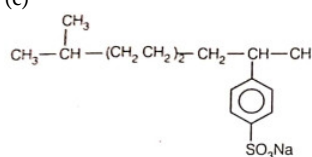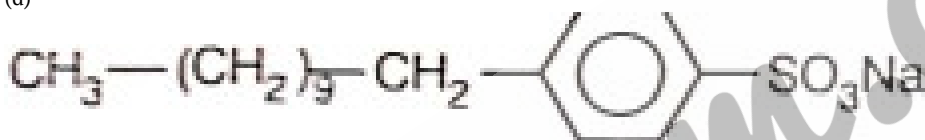67. Which of the following soap/detergent is least, reduce space biodegradable?
(a)

$$CH_3-(CH_2)_{11}-OSO_2Na$$

(b)

$$C_{17}H_{35}-COONa$$

(c)



(d)

$$CH_3-(CH_2)_3-CH_2-\underset{}{\bigcirc}-SO_3Na$$

Correct: c

68. In an atom, an electron is moving with a speed of 600 m/s with an accuracy of 0.005%. Certainty with which the position of the electron can be located is (Given, $h = 6.6 \times 10^{-34} kgm^2s^{-1}$ mass of electron $e_m = 9.1 \times 10^{-31}kg$)
(a) $2.15 \times 10^{-3}m$
(b) $2.78 \times 10^{-3}m$
(c) $1.92 \times 10^{-3}m$
(d) $3.24 \times 10^{-3}m$

Correct: c

69. At 27°C, one mole of an ideal gas is compressed isothermally and reversibly from a pressure of 2 atm to 10 atm. Choose the correct option from the following.
(a) Change in internal energy is positive
(b) Heat is negative
(c) Work done is - 965.84 cal
(d) All are incorrect

Correct: b

70. What would be the heat released when an aqueous solution containing 0.5 mole of $HNO_3$ is mixed with 0.3 mole of $OH^-$?
(enthalpy of neutralisation is - 57.1 kJ)
(a) 28.5 kJ
(b) 17.1 kJ
(c) 45.7 kJ
(d) 1.7 kJ

Correct: b

71. The number average molar mass and mass average molar mass of a polymer are respectively 30,000 and 40,000. The polydispersity index (PDI) of the polymer is
(a) -1
(b) 0

(c) > 1

(d) < 1

Correct: c

72. The charge/size ratio of a cation determines its polarising power. Which one of the following sequences represents the increasing order of the polarising power of the cationic species, $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$?

(a) $K' < Ca^{2+} < Mg^{2+} < Be^{2+}$

(b) $Be^{2+} < K^{2+} < Ca^{2+} < Mg^{2+}$

(c) $Mg^{2+} < Be^{2+} < K^+ < Ca^2$

(d) $Ca^{2+} < Mg^{2+} < Be^+ < K^+$

Correct: a

73. In an amino acid, the carboxyl group ionises at $pK_{a_1} = 2.34$ and ammonium ion at $pK_{a_2} = 9.60$. The isoelectric point of the amino acid is at pH

(a) 4.32

(b) 3.34

(c) 9.46

(d) 5.97

Correct: d

74. 0.40 g of helium in a bulb at a temperature of T K had a pressure of p atm. When the bulb was immersed in water bath at temperature 50 K more than the first one, 0.08 g of gas had to be removed to restore the original pressure. T is

(a) 500 K

(b) 400K

(c) 600 K

(d) 200K

Correct: d

75. What percentage of $\beta - D - (+)$ glucopyranose is found at equilibrium in the aqueous solution?

(a) 64%
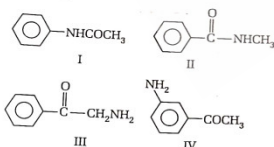
(b) 36%

(c) $\cong 100\%$

(d) $\cong 50\%$

Correct: a

76. If oxide ions are arranged in hcp and the aluminium ions occupy two thirds of octahedral voids. What will be the formula of the compound?

(a) $AlO_3$
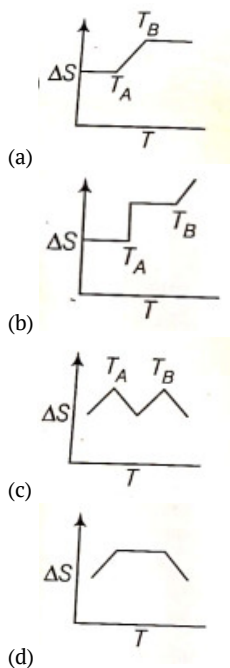
(b) $Al_2O_3$

(c) $(Al_2O_3)_2$

(d) $Al_3O_4$

Correct: b

77. The correct order of basic strength of the following are



(a) I > II > IV > III

(b) IV > III > II > I

(c) II > III > IV > I

(d) III > IV > II > I

Correct: d

78. If for a given substance, melting point is TB and freezing point is t, then correct variation of entropy by graph between entropy change and temperature is

(a)

(b)

(c)

(d)

Correct: b

79. When a mixture of 1-hexanol and hexanoic acid in diethyl ether is shaken with an aqueous $NaHCO_3$ solution, then which of the following is right distribution?

(a)

| In ether | In sodium bicarbonate solution |
|---|---|
| (a)   Sodium hexanoate | 1-hexanol |

(b)

| (b)   1-hexanol | Hexanoic acid |

(c)

| (c)   1-hexanol | Sodium hexanoat |

(d)

| (d)   Hexanoic acid | 1-hexanol |

Correct: c

$\Delta H$ and $\Delta S$ for the reaction,

$Ag_2O(s) \longrightarrow 2Ag(s) + \frac{1}{2}O_2(g)$, are 30.56 kJ mol$^{-1}$
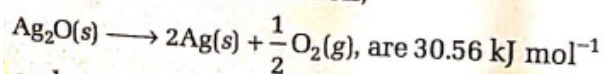
and   66.00 JK$^{-1}$ mol$^{-1}$   respectively.

80.   respectively. The temperature at which the free energy change for the reaction will be zero, is

(a) 3528 K
(b) 463 K
(c) 73 K
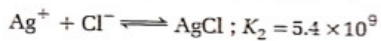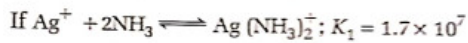(d) 144K

Correct: b

81. The $E^\circ$ values for Mn and Zn are more negative than expected because
(a) they have either half-filled and fully-filled configurations
(b) they can easily donate electrons
(c) it is Quite easy to remove electrons from their orbitals
(d) None of the above

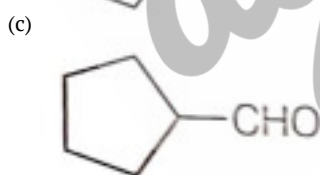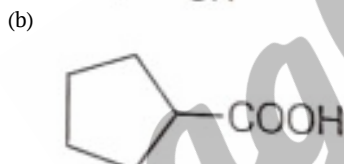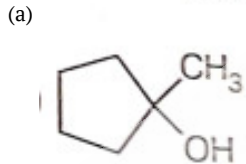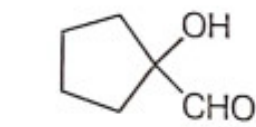Correct: a

If $Ag^+ + 2NH_3 \rightleftharpoons Ag\,(NH_3)_2^+$; $K_1 = 1.7 \times 10^7$

$Ag^+ + Cl^- \rightleftharpoons AgCl$; $K_2 = 5.4 \times 10^9$

Then, for $AgCl + 2NH_3 \rightleftharpoons [Ag\,(NH_3)_2]^+ + Cl^-$
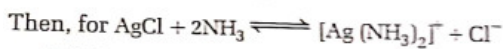
82. equilibrium constant will be
(a) $4.68 \times 10^{-3}$
(b) $5.2 \times 10^{-17}$
(c) $0.31 \times 10^{-2}$
(d) $3.1 \times 10^{-2}$

Correct: c
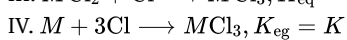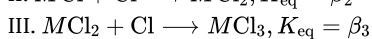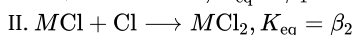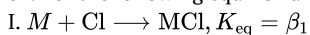
83. What is product of the following sequence of reactions?



(a)



(b)



(c)
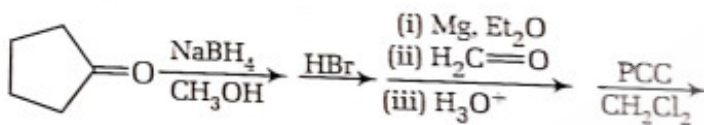


(d)

Correct: d

84. For the following equilibrium (omitting charges)
I. $M + Cl \longrightarrow MCl, K_{eq} = \beta_1$
II. $MCl + Cl \longrightarrow MCl_2, K_{eq} = \beta_2$
III. $MCl_2 + Cl \longrightarrow MCl_3, K_{eq} = \beta_3$
IV. $M + 3Cl \longrightarrow MCl_3, K_{eg} = K$
Then relationship between $K, \beta_1, \beta_2$ and $\beta_3$ is
(a) $K = \beta_1 \beta_2 \beta_3$
(b) $\log K = \log \beta_1 + \log \beta_2 + \log \beta_3$
(c) $p_k = p_{\beta_1} + p_{B_2} + p_{\beta_3}$
(d) All of the above

Correct: d

85. $R - CH_2 - CH_2 - OH$ can be converted into $RCH_2CH_2COOH$ by the following sequence of steps.
(a) $PB_3, KCN, H_2/Pt$
(b) $PBF_2, KCN_1 H_3O^+$
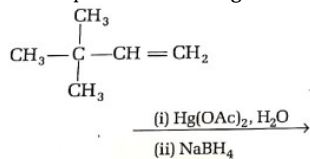(c) $HCNPBF_3, H_3O^+$
(d) $KCN, H_3O'$

Correct: b

86. Among the following compounds, which will produce POClz with PC15.
(a) only $O_2$
(b) $O_2$ and $CO_2$
(c) $CO_2, O_2$ and $P_4O_{10}$
(d) $SO_2, H_2O, H_2SO_4$ and $P_4O_{10}$

Correct: d

87. The product P of the given reaction is



(a)
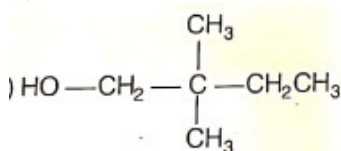


(b)



(c)



(d)



Correct: d

88. In acidic medium, dichromatic ion oxidises ferrous ion to 'ferric ion. If the gram molecular weight of potassium dichromate is 294 g, its gram equivalent weight (in grams) is
(a) 24.5
(b) 49
(c) 125
(d) 250

Correct: b

89. Find out the correct stereoisomeric product for the following reaction,



(a) d - form

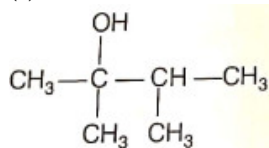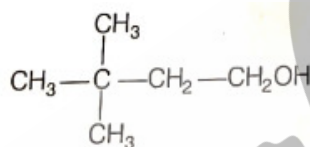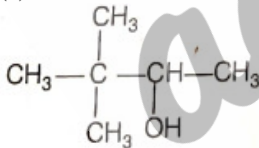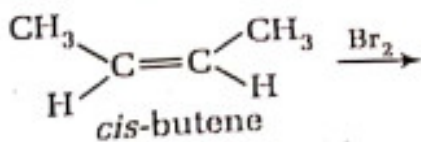(b) j - form

(c) meso - form

(d) racemic mixture

Correct: d

90. Ferrous oxide has a cubic structure. The length of edge of the unit cell is 5 Å and the Then the density of the oxide is $4.0 \text{gcm}^{-3}$ number of $Fe^{2+}$ and $O^{2-}$ present in each unit cell will be

(a) four $Fe^{2+}$ and two $O^{2-}$

(b) four $Fe^{2+}$ and $O^{2-}$

(c) two $Fe^{2+}$ and $O^{2-}$

(d) two $Fe^{2+}$ and $O^{2-}$

Correct: b

91. The energy released when 6 moles of octane is burnt in air will be [Given, $\Delta H'_f$ for $CO_2(g)$ and respectively are – 490, - 240 and + 160 J/mol]

(a) - 37.4 kJ

(b) - 20 kJ

(c) - 6.2 kJ

(d) - 35.5 kJ

Correct: d

92. Which of the following arrangements correctly represents hexagonal and cubic close packed structure respectively?

(a) ABAB ............. and ACBACB.

(b) ABCABC ......... and ABAB ............

(c) Both have ABCABC .............. arrangement

(d) Both have ABAB ............. arrangement

Correct: a

93. 0.001 mole of $\left[Co(NH_3)_5 (NO_3) (SO_4)\right]$ was passed through a cation exchanger and the acid coming out of it required 20 mL of 0.1 M NaOH for neutralisation. Thus, the complex is

(a) $\left[Co(NH_3)_5 (NO_3)\right] SO_4$

(b) $\left[Co(NH_3)_5 (SO_4)\right] NO_3$

(c) $\left[Co(NH_3)_5\right] NO_3 \cdot SO_4$

(d) None of the above

Correct: a

94. The molal freezing point depression constant for benzene $(C_6H_6)$ is $4.90 \text{KKgmol}^{-1}$ Selenium exists as a polymer of the type $Se_8$ . When 3.26 g of selenium is dissolved in 226g of benzene, the observed freezing point is 0.112°C lower than that of pure benzene. The molecular formula of selenium is (atomic mass of $Se = 78.8 \text{gmol}^{-1})$ )

(a) $Se_B$

(b) $Se_6$

(c) $Se_4$

(d) $Se_2$

Correct: a

95. In the complexes $\left[Fe(H_2O)_s\right]^{3+}, \left[Fe(CN)_6\right]^{3-} \left[Fe(C_2O_4)_3\right]^{3-}$ and $\left[FeCl_6\right]^{3-}$ more stability is shown by

(a) $\left[FeCl_6\right]^{3-}$

(b) $\left[Fe(C_2O_a)_3\right]^{3-}$

(c) $\left[Fe(H_2O)_6\right]^{3+}$

(d) $\left[Fe(CN)_6\right]^{3-}$

Correct: b

96. For an ideal binary liquid solution with $p_x^0 > p_y^0$ in which relation between $X_x$ (mole fraction of X in liquid phase) and $Y_x$ (mole fraction of X in vapour phase) is correct, $X_y$ , and $Y_y$ , are mole fraction of Y in liquid and vapour phase respectively

(a) $X_x > Y_x$

(b) $X_x = Y_x$

(c) $\frac{X_x}{X_y} < \frac{Y_x}{Y_y}$

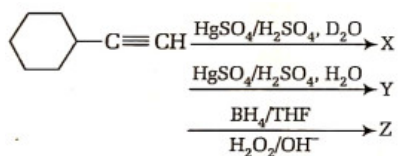(d) $X_x, Y_x, X_y$ and $Y_y$ cannot be correlated

Correct: c

97. Point out the incorrect reaction from the following.
(a) $2Na_2CrO_4 + H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$
(b) $4MnO_2 + 4KOH + O_2 \longrightarrow 4KMnO_4 + 2H_2O$
(c) $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$
(d) $MnO_4^- + 8H^+ + 5Fe^{2+} \longrightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$

Correct: b

98.



X,Y and Z respectively are
(a)
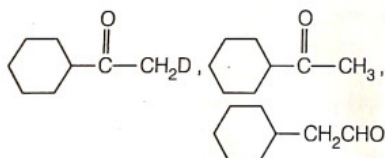


(b)
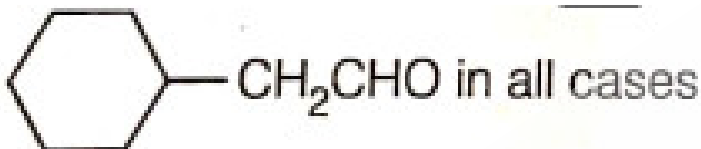


(c)



(d)
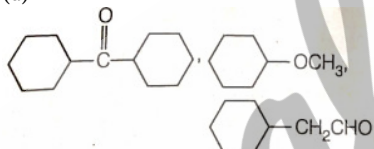


Correct: a

99. A student made the following observations in the laboratory
I. Clean copper metal did not react with 1 molar $Pb(NO_3)_2$ solution
II. Clean lead metal dissolved in a 1 molar $AgNO_3$ solution and crystals of Ag metal appeared
III. Clean silver metal did not react with 1 molar $Cu(NO_3)_2$ solution The order of decrease in reducing character of three metals is
(a) Pb, Cu, Ag
(b) Pb, Ag, Cu
(c) Cu, Ag, Pb
(d) Cu, Pb, Ag

Correct: a

100. The standard reduction potential for
$Zn^{2+}/Zn$, $Ni^{2+}/Ni$ and $Fe^{2+}/Fe$ are - 0.76,
$-0.23$ and $-0.44V$ respectively.
The reaction $X + Y^{2+} \longrightarrow X^{2+} + Y$ will be spontaneous when
(a) X= Ni, Y = Fe
(b) X = Ni, Y = Zn
(c) X = Fe, Y = Zn
(d) X= Zn, Y= Ni

Correct: d

101. The conductivity of $0.001028 \text{molL}^{-1}$ acetic acid is $4.95 \times 10^{-5} \text{Scm}^{-1}$. Find out its dissociation constant if $\Lambda_m$ for acetic acid is $390.5 \text{Scm}^{-1}\text{mol}^{-1}$.
(a) $H_2SO_4 > H_2SO_3 > H_2S_2O_8$
(b) $H_2S_2O_8 > H_2SO_3 > H_2SO_4$
(c) $3.72 \times 10^{-4} \text{molL}^{-1}$
(d) $2.37 \times 10^{-4} \text{molL}^{-t}$

Correct: b

102. In order to prepare one litre 1N solution of $KMnO_4$ how many grams of $KMnO_4$ are required, if the solution to be used in acid medium for oxidation?
(a) 128 g
(b) 41.75 g
(c) 31.60 g
(d) 62.34 g

Correct: c

103. Which of the following represents the correct order of decreasing number of SEO bonds?
(a) $H_2SO_4 > H_2SO_3 > H_2S_2O_8$
(b) $H_2S_2O_8 > H_2SO_3 > H_2SO_4$
(c) $H_2S_2O_8 > H_2SO_4 > H_2SO_3$
(d) $H_2SO_3 > H_2S_2O_8 > H_2SO_4$

Correct: c

104. A hypothetical reaction,

$X_2 + Y_2 \longrightarrow 2XY$ follows the following mechanism

$X_2 \rightleftharpoons X + X$ .......... fast
$X + Y_2 \longrightarrow XY + Y$ ...... slow
$X + Y \longrightarrow XY$ .......... fast
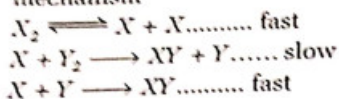
The order of the overall reaction is
(a) 2
(c) 3/2
(c) 1
(d) 0

Correct: b

105. The major role of fluorspar $(CaF_2)$ which is added in small quantity in the electrolytic reduction of alumina dissolved in fused cryolite $(Na_3, AlF_e)$ is
I. as a catalyst.
II. to make the fused mixture very conducting.
III. to lower the temperature of melting.
IV. to decrease the rate of oxidation of carbon at the anode.
(a) I,II
(b) II, III
(c) I, II, III
(d) III, IV

Correct: b

106. The variation of concentration of the product P with time in the reaction,
$A \to P$ is shown in following graph.
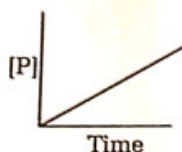


The graph between $\frac{-d[A]}{dt}$ and time will be of the type
(a)

$$\frac{-d[A]}{dt}$$ | Time

(b)

$$\frac{-d[A]}{dt}$$ | Time

(c)

$$\frac{-d[A]}{dt}$$ | Time

(d)

$$\frac{-d[A]}{dt}$$ | Time
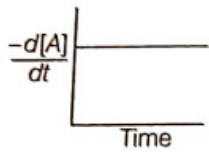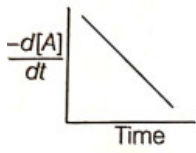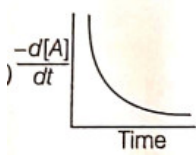
Correct: a

107. Point out the correct statement.
(a) Below 710°C, C is better reducing agent than CO
(b) Below 710°C, CO is better reducing agent than C
(c) Below 710°C, CO is an oxidising agent
(d) Below 710°C, CO, is a reducing agent

Correct: b

108. Which of the following represents physical adsorption?
(a)

$$\frac{x}{m}$$ | Temp →

(b)

$$\frac{x}{m}$$ | Temp →

(c)

$$\frac{x}{m}$$ | Temp →

(d)

$$\frac{x}{m}$$ | Temp →
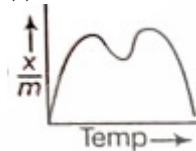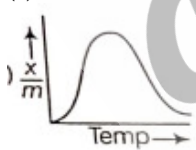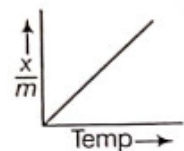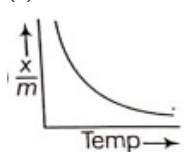
Correct: d

109. $KMnO_4$ reacts with ferrous sulphate according to the following equation, $MnO_3^- + 5Fe^{2+} + 8H^- \longrightarrow$
$Mn^{2+} + 2Fe^{3+} + 4H_2O$

Here, 10 mL of 0.1 M $KMnO_4$ is equivalent to
(a) 50mL of $0.1MFeSO_4$
(b) 20mL of $0.1MFeSO_4$
(c) 40mL of $0.1MFeSO_4$
(d) 30mL of $0.1MFeSO_4$

Correct: a

110. In an experiment, addition of 4.0 mL of 0.005 M $BaCl_2$ to 16.0 mL of arsenious sulphide sol just causes complete coagulation in 2 h. The flocculating value of the effective ion is
(a) $Ba^{2+}$, 1.0
(b) $Ba^{2+}$, 2.0
(c) $Cl^-$, 1, 0
(d) $Cl^-$, 2.0

Correct: a

111. Which of the following atomic and physical properties of hydrogen is false?
(a) Hydrogen > Deuterium > Tritium; (melting point/K )
(b) Hydrogen < Deuterium < Tritium; (boiling point/K )
(c) Hydrogen < Deuterium < Tritium: (density $gL^{-1}$ )
(d) Hydrogen > Deuterium > Tritium; ( %relative abundance )

Correct: a

112. A solid AB has NaCl structure. If the radius of cation $A^+$ is 170 pm, then the maximum possible radius of the anion $B^-$ is
(a) 397.4pm
(b) 347.9pm
(c) 210.9pm
(d) 410.6pm

Correct: d

113. When $H_2O_2$ is added to ice cold solution of acidified potassium dichromate in ether and the contents are shaken and allowed to stand
(a) a blue colour is obtained in ether because of formation of $CrO_5$
(b) a blue colour is obtained in ether because of formation of $CrO_3$
(c) a blue colour is obtained in ether because of formation of $C_2(SO_4)_3$
(d) chromyl chloride is formed

Correct: a

114. 500 mL of a sample of water required 19.6 mg of $K_2C_2O_7$ for the oxidation of dissolved organic matter in it in the presence of $H_2SO_4$ . The COD of water sample is
(a) 3.2 ppm
(b) 7.2 ppm
(c) 6.4 ppm
(d) 4.6 ppm

Correct: c

115.

$X + Na_2CO_3 \longrightarrow Y + Z$

$\downarrow CO_2$

$\longrightarrow Z$ (milky cloud)
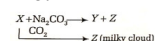
The chemical formulae of $X, Y$ and $Z$ are

|  | X | Y | Z |
|---|---|---|---|
| (a) | CaO | Ca(OH)$_2$ | NaOH |
| (b) | NaOH | CaO | CaCO$_3$ |
| (c) | NaOH | Ca(OH)$_2$ | CaCO$_2$ |
| (d) | Ca(OH)$_2$ | NaOH | CaCO$_3$ |

The chemical formulae of X,Y, and Z are

(a)

| (a) | CaO | Ca(OH)$_2$ | NaC |
|---|---|---|---|

(b)

(b) | NaOH | CaO | Ca(

(c)

(c) | NaOH | $Ca(OH)_2$ | $CaCO_3$

(d)

(d) | $Ca(OH)_2$ | NaOH | $CaCO_3$

Correct: d

116. For carbanion
Stability order will be
(a) $P > Q > S > R$
(b) $P > R > Q > S$
(c) $Q > R > S > R$
(d) $S > R > Q > P$

Correct: b

117. The aqueous solution of an unknown sodium salt gives the following reactions.
I. It decolourises a solution of iodine in potassium iodide.
II. It gives white turbidity with dil. HCl solution.
III. It gives a white precipitate with $AgNO_3$ solution which changes colours and finally becomes black on standing.
The unknown sodium salt is
(a) sodium thiosulphate
(b) sodium bisulphite
(c) sodium sulphite
(d) sodium sulphide

Correct: a

118. The catenation tendency of C, Si and Ge is in the order Ge < Si < C. The bond energies (in kJ mol$^{-1}$) of C—C, Si—Si and Ge-Ge bonds, respectively are
(a) 348, 167, 180
(b) 348, 180, 167
(c) 167, 180, 348
(d) 180, 167, 348

Correct: b

119. What is correct about the following structure?
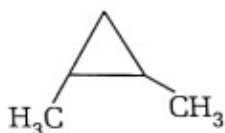


(a) Total stereoisomers = 4
(b) Number of chiral carbons = 1
(c) Number of optical isomers = 2
(d) Number of meso compounds = 2

Correct: c

120. In which of the following, the oxidation din number of oxygen has been arranged in increasing order?

(a) $BaO_2 < KO_2 < O_3 < OF_2$
(b) $OF_2 < KO_2 < BaO_2 < O_3$
(c) $BaO_2 < O_3 < OF_2 < KO_2$
(d) $KO_2 < OF_2 < O_3 < BaO_2$

Correct: a

# Biology

121. One of the breeding techniques useful to eliminate harmful recessive genes by selection is
(a) artificial insemination
(b) outbreeding
(c) inbreeding
(d) MOET

Correct: c

122. Vitamin $-B_{12}$ is absorbed primarily in the
(a) stomach
(b) duodenum
(c) jejunum
(d) ileum

Correct: d

123. The faster breathing in high fever is due to the
(a) additional requirement of $O_2$, for the invader germs
(b) high temperature of the body
(c) mental worry of a patient
(d) loss of appetite

Correct: b

124. Which of the following animals possess non-elastic lungs with elastic air sacs connected to them?
(a) Reptiles
(b) Birds
(c) Amphibians
(d) Mammals

Correct: b

125. Which of the following is not correctly matched?
(a) Trichomonas vaginalis - Leishmaniasis
(b) Glossina palpalis - Sleeping sickness
(c) Aedes agypti - Yellow fever
(d) Culex pipceins - Filariasis

Correct: a

126. Carotid labyrinth contains
(a) olfactory receptors
(b) baroreceptors
(c) chemoreceptors
(d) phonoreceptors

Correct: b

127. Match the following columns.

| | Column I | | Column II |
|---|---|---|---|
| A. | Sacral nerves | 1. | 1 Pair |
| B. | Thoraic nerves | 2. | 8 Pairs |
| C. | Cocygeal nerves | 3. | 7 Pairs |
| D. | Cervical nerves | 4. | 12 Pairs |
| | | 5. | 5 Pairs |

Codes
  A  B  C  D

(a) 4  1  3  2
(b) 5  3  1  2
(c) 5  4  1  2
(d) 2  5  3  1

Correct: c

128. Epiphyseal plates at the extremities of long bones help in
(a) bone moulding
(b) elongation of bone
(c) bone formation
(d) formation of Haversian canal

Correct: a

129. The strongest muscle in the human is
(a) biceps
(b) gluteus maximus
(c) stapodius
(d) masseter

Correct: d

130. Parkinsonism is related with
(a) brain
(b) spinal nerve
(c) cranial nerves
(d) All of these

Correct: a

131. Meniere's disease is associated with
(a) ear
(b) eye
(c) nose
(d) throat

Correct: a

132. If the threshold for hearing increasing 1000 times, the hearing loss is
(a) 40 decibels
(b) 50 decibels
(c) 60 decibels
(d) None of these

Correct: d

133. Gonads are derived from
(a) ectoderm
(b) mesoderm
(c) endoderm
(d) None of the above

Correct: b

134. The number of chromosomes in a primary spermatocyte is
(a) same as in spermatid
(b) same as in spermatogonium
(c) help of that in spermatogonium
(d) same as in secondary spermatocyte
Correct: b

135. With respect to angiosperms, identify the incorrect pair from the following
(a) antipodal —2n
(b) vegetative all of male gametophyten
(c) primary endosperm nucleus -3n
(d) cell of nucellus of ovule—2n

Correct: a

136. Depo-provera refers to
(a) injectible contraceptive
(b) intra uterine device
(c) implant
(d) oral contraceptive

Correct: a

137. What base is responsible for hot spots for spontaneous point mutations?
(a) Adenine
(b) Guanine
(c) 5-bromouracil
(d) 5-methyl cytosine

Correct: c

138. During which geological period of evolution did the greatest diversification of life occurred on the earth?
(a) Permian
(b) Jurassic
(c) Cambrian
(d) Ordovician

Correct: c

139. Specific radioacitve identification of ribosomal RNA can be achieved by using $C^{14}$ labelled
(a) guanine
(b) uracil
(c) thymine
(d) cytocine

Correct: b

140. Which of the following is the Pribnow box?
(a) $5' - TATAAT - 3'$
(b) $5' - TAATAT - 3'$
(c) $5' - AATAAT - 3'$
(d) $5' - ATATTA - 3'$

Correct: a

141. The genome of Caenorhabditis elegans consists of
(a) 3 billion base pairs and 30,000 genes
(b) 12 million base pairs and 6000 genes
(c) 4.7 million base pairs and 4000 genes
(d) 97 million base pairs and 18,000 genes

Correct: b

142. About how long ago was the earth formed ?
(a) 3 billion years ago
(b) 10 billion years ago
(c) 4.6 billion years ago
(d) 20 billion years ago

Correct: c

143. Gas gangrene is caused by
(a) Clostridium botulinum
(b) Xanthomonas campestris
(c) Pseudomonas
(d) Clostridium perfringens

Correct: d

144. Who received Nobel Prize in 1951 for the development of vaccine for yellow fever?
(a) Max Theiler
(b) Ronald Ross
(c) Max Delbruck

(d) Francis Peyton Rous

Correct: a

145. Continuous exposer to vinyl chloride may cause cancer of the
(a) liver
(b) spleen
(c) vagina
(d) prostate gland

Correct: a

146. Which of the following T-cells are destroyed by HIV?
(a) Cytotoxic T-cells
(b) Killer T-cells
(c) Suppressor T-cells
(d) Helper T-cells

Correct: d

147. An autoimmune disease is
(a) AIDS
(b) haemophilia
(c) allergy
(d) myasthenia gravis

Correct: d

148. The phenotypic ratio of trihybrid cross in $F_2-$ generation is
(a) 27:9:9:9:3:3:3:1
(b) 9:3:3:1
(c) 1:4:6:4:1
(d) 27:9:3:3:9:1:2:1

Correct: a

149. Which of the following act as an antigen, but do not induce antibody production?
(a) Haustra
(b) Histones
(c) Haptens
(d) None of these

Correct: c

150. Haldane effect refers to
(a) more acidity in the blood
(b) less acidity in the blood
(c) more basicity in the blood
(d) less basicity in the blood

Correct: a

151. The plant whose seeds are known to leave the longest viability period is (a) Carica papaya
(b) Triticum aestivum
(c) Zizypus mauritiana
(d) Nelumbo nucifera

Correct: d

152. Jute is a
(a) bast fibre from secondary xylem
(b) bast fibre from primary xylem
(c) bast fibre from secondary phloem
(d) bast fibre from primary phloem

Correct: c

153. Chlorosis is produced in the leaves due to the deficiency of Fe, Mg, Mn, S or N of these essential elements, those that are exclusive constituents of chlorophyll molecule are

(a) Fe, S
(b) NS
(c) Mg, S
(d) Mg. N

Correct: d

154. Read the following statements and choose the correct option.
I. Leptosporangiate development of sporangium is found in all members
Pteropsida.
II. Seed habit is shown by Sellaginella.
III. Gnetum leaves are monomorphic and pinnately compound.
IV. Sporic meiosis is found in Volvox, Chlamydomonas and Ulothrix. Choose the correct option.
(a) I and IV
(b) I and 11
(c) I, II and IV
(d) All of these

Correct: c

155. Which of the following characteristics out of
I, II and III are exhibited by $C_4$ plants?
I. Kranz anatomy.
II. The product of photosynthesis is oxalo acetic acid.
III. Both PEP carboxylase and ribulose-bisphosphate carboxylase act as carboxylating enzyme.
Choose the correct option.
(a) I and II, but not III
(b) II and III, but not
(c) I and III, but not II
(d) All of those

Correct: d

156. Match the following column I and II for organismic respiration.

| Column I | | Column II | |
|---|---|---|---|
| A. | Respiration in bacteria | 1. | Mitochondria |
| B. | Respiration in cyanobacteria | 2. | Cytoplasmic membrane |
| C. | Respiration in eukaryotic cell | 3. | Mesosomes |

(a) A-2, B-3 , C-1
(b) A-3, B-2, C-1
(c) A-1, B-3, C-2
(d) A-3, B-1, C-2

Correct: b

157. Compare the statements I and II and choose correct option.
Statement (I)
Auxin promote apical dominance by suppressing the activity of lateral buds. Statement (II)
In moriculture, periodic prunning of shoot tips is done to make mulberry plants bushy.
Choose the correct options.
(a) I is false, but II is true
(b) Il is false, but I is true
(c) Both I and II are true
(d) Both I and II are false

Correct: c

158. Following are the two statements regarding the origin of life.
I. The earliest organisms that appeared on the earth were non-green and presumably
an aerobes.
II. The first autotrophic organisms were the chemoautotrophs that never released oxygen of the above statements which of the following
options is correct?
(a) II is correct, but I is false
(b) Both I and II are correct
(c) Both I and II are false
(d) I is correct, but II is false

Correct: b

159. In coconut, the liquid endosperm is formed because
(a) karyokinesis is not followed by cytokinesis
(b) karyokinesis is followed by cytokinesis
(c) formation of liquid endosperm is not dependent upon karyokinesis and cytokinesis
(d) None of the above

Correct: c

160. Keeping is view the structure of cell membrane, which one of the following statements is correct with respect to the movements of liquid and proteins from one liquid monolayer to the other (flip flop movement)
(a) While proteins can flip flop, liquids can not
(b) Neither lipids, nor proteins can flip flop
(c) Both lipids and proteins can flip flop
(d) While lipids can rarely flip flop, proteins can not

Correct: d

161. Ribosomes are particles about 200 Å units in diameter consisting of protein and RNA. The percentage of protein and RNA is respectively
(a) 80% and 20%
(b) 60% and 40%
(c) 50% and 50%
(d) 40% and 60%

Correct: b

162. Match the biological molecule listed under column I with their biological function listed under column II.
Choose the answer which gives correct combination of alphabets of the two columns.

| Column I (Biological Molecule) | | Column II (Function) | |
|---|---|---|---|
| A. | Glycogen | 1. | Hormone |
| B. | Globulin | 2. | Biocatalyst |
| C. | Steroid | 3. | Antibody |
| D. | Thrombin | 4. | Storage product |

(a) A-3, B-2, C-4, D-1
(b) A-4, B-2, C-1, D-3
(c) A-2, B-4, C-3, D-1
(d) A-4, B-3, C-1, D-2

Correct: d

163. In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants could you expect in Fi-generation.
(a) 9:1
(b) 1:3
(c) 3:1
(d) 50: 50

Correct: d

164. In a mutational event, when adenine is replaced by guanine, it is a case of
(a) frameshift mutation
(b) transcription
(c) transition
(d) transversion

Correct: c

165. Monoclonal antibodies and polyclonal antibodies are produced by
(a) T-memory cells
(b) NK-cells
(c) plasma cells of B-lymphocytes
(d) memory cells of B-lymphocytes

Correct: c

166. The non-disjunction, in meiosis may result is extra copy of a chromosome in a sperm cell. During which phase the above phenomenon may occur?
(a) Prophase-l, prophase-|
(b) Metaphase-I, anaphase-Il

(c) Anaphase-l, anaphase-Il
(d) Anaphase-I, telophase-Il

Correct: c

167. Which of the following is true regarding the phage lambda, a virus which infects bacteria?
(a) In the lytic cycle, the bacterial host replicates viral DNA, passing it on to daughter cells during binary fission
(b) In the lysogenic cycle, the bacterial host replicates viral DNA, passing it onto daughter cells during binary fission
(c) In the lytic cycle, viral DNA is integrated into the host genome
(d) In the lysogenic cycle, the host bacterial cell burst, releasing phases

Correct: b

168. The part of the bacterial chromosome sharing homology with genome fragment transferred from the recipients to cell during merozygote formation is known as
(a) eugenic
(b) exogenate
(c) endogenate
(d) dysgenic

Correct: c

169. In 1944, Avery, McCarty and MacLeod isolated a substance from heat killed virulent form of bacteria and added to non-virulent form of bacteria which changed the non-virulent to virulent from this substance can be destroyed by
(a) DNAase
(b) protease
(c) lipase
(d) amylase

Correct: a

170. Thermococcus, Methanococcus and Methanobacterium are groups of (a) bacteria containing a cytoskeleton and all membrane bound organelles (b) archaebacteria with peptidoglycan in their cell wall protein
(c) archaebacteria that consists of homologous to eukaryotic core histones (d) most advanced type of bacteria

Correct: c

171. Match the following Column I with Column II

| Column I | | Column II |
| --- | --- | --- |
| A. Complementary ratio | 1. | 9 : 7 |
| B. Supplementary ratio | 2. | 9 : 3 : 4 |
| C. Epistatic ratio (Masking) | 3. | 12 : 3 : 1 |
| D. Inhibitory ratio | 4. | 13 : 3 |

(a) A-4, B-1, C-3, D-2
(b) A-1, B-2, C-3, D-4
(c) A-4, B-1, C-2, D-3
(d) A-1, B-3, C-2, D-4

Correct: b

172. Which of the following sequences represent a possible pathway in the production of a secretory protein?
(a) Rough ER →Secretory vesicle → Ribosome → Golgi apparatus
(b) Ribosome → Rough ER → Golgi apparatus → Secretory vesicle
(c) Secretory vesicle → Golgi apparatus →Ribosomes →Rough ER
(d) Rough ER → Ribosomes → Secretory vesicles → Golgi apparatus

Correct: d

173. A connecting link between plant and animal kingdom is
(a) Paramecium
(b) Chlamydomonas
(c) Chlorella
(d) Euglena

Correct: d

174. Which of the following statements is false regarding SDS-polyacrylamide gel electrophoresis?
(a) Proteins are separated by molecular weight
(b) SDS is a detergent which gives charge to protein

(c) Large protein move more slowly through gel

(d) SDS is used to maintain the 3-dimensional structure of protein

Correct: d

175. If the free energy change of a reaction is greater than zero, then the reaction is

(a) spontaneous .

(b) non-spontaneous

(c) at equilibrium

(d) endothermic

Correct: d

176. Match the following columns

| Column I | Column II |
| --- | --- |
| A. Molecular oxygen | 1. α-ketoglutaric acid |
| B. Electron acceptor | 2. Hydrogen acceptor |
| C. Pyruvate dehydrogenase | 3. Cytochrome-C |
| D. Decarboxylation | 4. Acetyl Co-A |

Codes

  A B C D

(a) 2 3 4 1

(b) 3 4 2 1

(c) 2 1 3 4

(d) 4 3 1 2

Correct: a

177. The enzyme hexokinase which catalysis glucose to a glucose-6-phosphate in glycolysis is inhibited by glucose-6-phosphate. This is an example of

I. competitive inhibition

II. non-competitive inhibition

III. feedback allosteric inhibition Which of the above statements is/are correct?

(a) I and II

(b) I and III

(c) Only III

(d) All of these

Correct: c

178. The protein products of tumour suppressor gene may

(a) be present in non-cancerous cells

(b) cause signal cell death

(c) regulate the cell cycle

(d) All of the above

Correct: a

179. The mitotic cell cycle is divided typically into four phases: $G_1, S, G_2$ and M. Considering a mitotic cycle time of 18 hrs; the distribution of

(a) G1-1, S-3, G2-5, M-9

(b) G1-9, S-1, G2-3, M-5

(c) G1-9, S-5, G2-3, M-1

(d) G1-3, S-5, G2-5, M-9

Correct: c

180. Slime-mould belongs to

(a) kingdom — Protista

(b) kingdom — Monera

(c) kingdom — Fungi

(d) kingdom — Plantae

Correct: a

**English**

181. When the bus reaches Shivani's house, it faces South. After starting from Shivani's house to the school, it turns twice to its left and once to its right. In which direction it is running now?
(a) North
(b) West
(c) East
(d) South

Correct: c

182. A men travels 12 km West, then 3 km towards South and then 8 km towards East. How far is he from the start?
(a) 23 km
(b) 20 km
(c) 15 km
(d) 5 km

Correct: d

183. From the given alternative words, select the one which can be formed using the letters of the given word EXAMINATION.
(a) ANIMAL
(b) EXAMINER
(c) NATIONAL
(d) ANIMATION

Correct: d

184. Fill in the blank.
Freedom and equality are the rights of every human.
(a) inalienable
(b) inscrutable
(c) incalculable
(d) incredible

Correct: d

185. QPRS : TUVW :: JIKL :?
(a) NMOP
(b) NMPO
(c) MNPO
(d) MNOP

Correct: c

186. Find the odd letter pair from the given alternatives.
(a) Wool
(b) Feather
(c) Hair
(d) Grass

Correct: d

187. Find the missing number/letter from the given alternatives.
BMO, EOQ, HQS,?
(a) SOW
(b) LMN
(c) KSU
(d) SOV

Correct: c

188. If + means -, - means X, X means + and means +, then 48 X 4 +7+ 8-2= ?
(a) 3
(b) -5
(c) 35
(d) 16

Correct: a

189. If February 1, 2004 IN Wednesday, what day in March 3, 2004
(a) Monday
(b) Sunday
(c) Saturday
(d) Friday

Correct: c

190. How many triangles are there in the given figure
(a) 5
(b) 4
(c) 3
(d) 8

Correct: d

191. In each of the following questions, select the missing number from the given alternatives.

| 2 | 7 | 9 |
|---|---|---|
| 7 | 3 | 4 |
| 9 | 8 | ? |
| 126 | 168 | 216 |

(a) 8
(b) 3
(c) 6
(d) 36

Correct: c

192. Out of the four alternatives, choose the one which best expresses the meaning of the given word.
Voracious
(a) Quick
(b) Angry
(c) Hungry
(d) Wild Directions

Correct: c

193. If the 1st of November falls on Monday, what day will the 25th of November will be?
(a) Tuesday
(b) Thursday
(c) Wednesday
(d) Friday

Correct: b

194. Choose the word opposite in meaning to the given word.
Indiscreet
(a) Reliable
(b) Honest
(c) Prudent
(d) Stupid Directions

Correct: c

195. Complete the series by replacing '?' mark.
G4T, J9R, M20P, P43N, SOOL, ?
(a) SOOL
(b) V185J
(c) M20P
(d) P43N

Correct: d

196. In the following question, a sentence has divided into four parts. Arrange these parts to make the sentence meaningful.
In favour of English,
P : has chances of securing employment
Q : we may say that
R : In all parts of India and in foreign countries
S : an English knowing Indian

(a) OSPR
(b) SPOR
(c) SROP
(d) QRPS

Correct: a

197. In the following question, a sentence has divided into four parts. Arrange these parts to make the sentence meaningful.
The hungry man
P : and said
Q : replied in the negative
R : that he only wanted a meal
S : to his question
(a) SQPR
(b) QSPR
(c) SPRQ
(d) QPRS

Correct: b

198. In the following question, a sentence has divided into four parts. Arrange these parts to make the sentence meaningful.
It is
P : that people read fewer books today
Q : than they did R:even about a decade ago
S : a matter of grave concern
(a) PSRQ
(b) SPRQ
(c) PSQR
(d) SPQR

Correct: d

199. Groups of four words are given. In each group, one word is correctly spelt. Find the correctly spelt word.
(a) Paraphamelia
(b) Parsimonious
(c) Peccadilo
(d) Peadialriis

Correct: b

200. Groups of four words are given. In each group, one word is correctly spelt. Find the correctly spelt word.
(a) Tussel
(b) Tunnel
(c) Tumble
(d) Trable

Correct: a