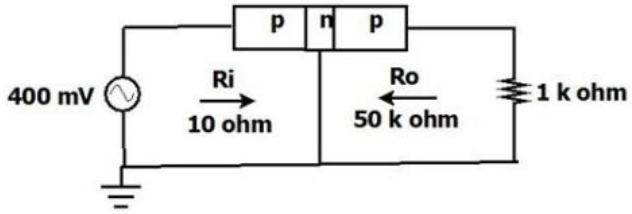
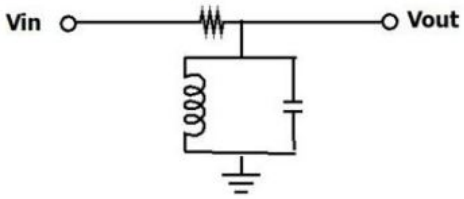
Module Name : MSc Physics-E
Exam Date : 19-Sep-2020 Batch : 16:00-18:00

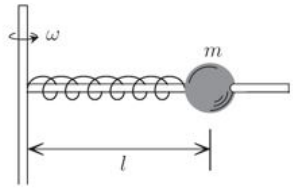
Sr. No.	Client Question ID	Question Body and Alternatives	Marks	Negative Marks
Objective Question				
1	1	Consider the fringe pattern obtained on a screen due to diffraction at a single Slit. At the position of the first minimum, the phase difference between the Wavelets from the opposite edges of the slit is A1 : $\pi / 2$ A2 : π A3 : 2π A4 : 0	4.0	1.00
Objective Question				
2	2	Silicon (Z = 14) has two electrons in the unfilled 3p shells. According to Hund's rule the ground state of Si is A1 : $^3P_0$ A2 : $^3S_1$ A3 : $^3D_3$ A4 : $^3D_1$	4.0	1.00
Objective Question				
3	3	The intensity of electronic O-O band of a diatomic molecule is very intense when the minimum of the potential curve for the upper electronic state lies (here r is the internuclear destance) A1 : at the same value of r as that of the lower potential curve A2 : at a smaller value of r then that of the lower potential curve A3 : at a large value of r than that of the lower potential curve A4 : above the dissociation level of the lower potential curve	4.0	1.00
Objective Question				
4	4	The alternation of intensities observed in the pure rotational Raman spectrum of homonuclear diatomic molecules is due to A1 isotope effect	4.0	1.00

		: A2 : nuclear spin A3 : electron spin A4 : Doppler effect		
Objective Question				
5	5	The ratio of ground state energy of Hydrogen atom and Helium atom, according to Bohr model, is A1 : 1:2 A2 : 2:1 A3 : 1:4 A4 : 4:1	4.0	1.00
Objective Question				
6	6	The wave length of electrons having kinetic energy 100 eV is A1 : $0.228\ A^0$ A2 : $1.228\ A^0$ A3 : $2.228\ A^0$ A4 : $3.228\ A^0$	4.0	1.00
Objective Question				
7	7	Selection rule for Raman spectrum is A1 : $\Delta J = 0$ A2 : $\Delta J = \pm 1$ A3 : $\Delta J = \pm 2$ A4 : $\Delta J = \pm 3$	4.0	1.00
Objective Question				
8	8	Consider a Ge p-n junction diode operating at T = 300 K with a diode current of 10 mA and reverse saturation current of 1	4.0	1.00

		nA. Determine the applied voltage V_D of the diode. A1 : ~ 0.4 V A2 : ~ 0.7 V A3 : ~ 1.4 V A4 : ~ 0 V		
Objective Question				
9	9	Calculate the magnetic field that is required to obtain the following electrical parameters in a Silicon Hall device. (d = 5 × 10^{-3} cm, W = 5× 10^{-2} cm, L = 0.5 cm, I_x = 0.5 mA, n = 5 × 10^{15} cm^{-3}, V_x = 1.25 V and V_H = -0.825 mV). A1 : 10050 Gauss A2 : 1050 Gauss A3 : 650 Gauss A4 : 2050 Gauss	4.0	1.00
Objective Question				
10	10	Determine the voltage gain A_v of the following circuit (assume $\alpha = 1$).  A1 : A_v ~ 200 A2 : A_v ~ 300 A3 : A_v ~100 A4 : A_v ~ 400	4.0	1.00
Objective Question				
11	11	Determine the magnitude and phase of A_v at f = f_c/3 of a high-pass filter circuit with R = 40 kΩ and C = 1000 pF. A1 : 0.32 ∠71.56°	4.0	1.00

		A2 : $0.1 \angle 32.63°$ A3 : $0.4 \angle 61.52°$ A4 : $1 \angle 0°$		
Objective Question				
12	12	Identify the out-put voltage versus frequency of the following filter circuit corresponds to:  A1 : Low-pass filter A2 : High-pass filter A3 : Band-pass filter A4 : Band-stop filter	4.0	1.00
Objective Question				
13	13	In a voltage-divider biased Si *npn BJT* transistor circuit, V_B is 3.85 V. The dc emitter voltage is _____ A1 : 3.15 V A2 : 4.55 V A3 : 0.7 V A4 : 1.12 V	4.0	1.00
Objective Question				
14	14		4.0	1.00

Assume that a spring of spring-constant k has zero length in the unstretched state. Its one end is attached to a vertical bar which is rotating at an angular velocity ω, and the other end is attached to a bead of mass m which is sliding on the frictionless horizontal bar which is attached to the vertical bar. What is the length l of the rotating spring?



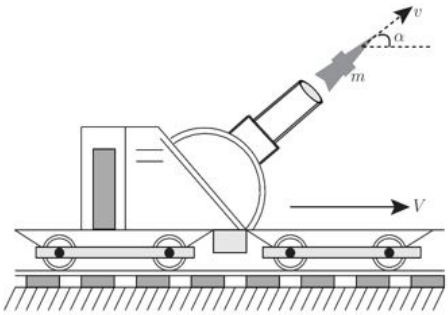
A1 : $\frac{k}{m\omega}$

A2 : $\frac{m\omega}{k}$

A3 : $\frac{2k}{m\omega}$

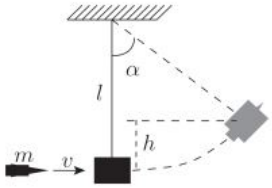
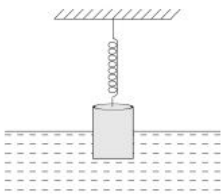
A4 : $\frac{m\omega}{2k}$

Objective Question

15	15	A railway flatcar, whose mass together with an artillery gun is M, moves at a speed V along the $x-$axis as shown in the figure. The gun barrel makes an angle α with this axis. A projectile of mass m leaves the gun at speed v (relative to the gun) in the direction shown in the figure. What should the speed V of the flatcar be so that it is stopped after the firing?  A1 : $\frac{Mv\cos\alpha}{M+m}$ A2 : $\frac{mv}{M+m}$ A3 : $\frac{mv\cos\alpha}{M+m}$ A4 : $v\cos\alpha.$	4.0	1.00

Objective Question

16	16		4.0	1.00

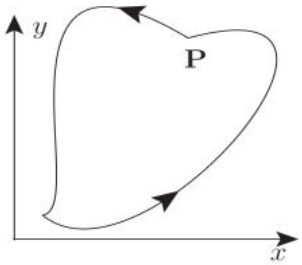
		A string is wrapped around a cylinder of mass m and radius r. The string is pulled vertically upward to prevent the centre of mass from falling as the cylinder falls under gravity and unwinds the string. Find the length of the string unwound when the cylinder has reached a speed ω. A1 : $\frac{r^2\omega^2}{2g}$ A2 : $\frac{r^2\omega^2}{4g}$ A3 : $\frac{g}{4\omega^2}$ A4 : $\frac{g}{2\omega^2}$		
Objective Question				
17	17	A ballistic pendulum is a wooden block of mass M suspended from a fixed support by a thread of length l. A bullet with the mass m hits the block and sticks in it, the result being a deflection of the system by an angle α. The height h to which the block raises is given by  A1 : $\frac{v^2}{2g}$ A2 : $\frac{v^2}{2g}\left(\frac{m+M}{m}\right)$ A3 : $\frac{v^2}{2g}\left(\frac{m}{m+M}\right)$ A4 : $\frac{v^2}{2g}\left(\frac{m}{m+M}\right)^2$	4.0	1.00
Objective Question				
18	18	A cylindrical object of volume V and density ρ is supported by a vertical spring of spring constant k; and it is half-dipped in a liquid of density ρ_0 as shown in the figure. What is the elongation of the spring in this equilibrium position?  A1 : $\frac{gV}{2k}(2\rho-\rho_0)$	4.0	1.00

A2 : $\frac{gV}{2k}(\rho - 2\rho_0)$

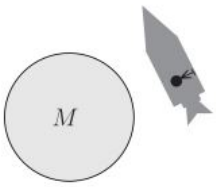
A3 : $\frac{gV}{k}(\rho - 2\rho_0)$

A4 : $\frac{gV}{k}(2\rho - \rho_0)$

Objective Question

19	19	A particle is moving under the influence of a two-dimensional potential $V(x, y)$. It starts moving from the point P taking the path as indicated by the arrows in the figure, and comes back to the same point after travelling the distance l along this closed path that encloses the area A. What is the amount of energy spent by the particle in this process?  A1 : $\frac{A}{l}\left(\frac{\partial V}{\partial x} + \frac{\partial V}{\partial y}\right)$ A2 : $A^2\left(\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2}\right)$ A3 : 0 A4 : $l\left(\frac{\partial V}{\partial x} + \frac{\partial V}{\partial y}\right)$	4.0	1.00

Objective Question

20	20	A rocket is going around a planet of mass M in a circular orbit with the speed v. The mass of a man on-board the rocket is m. If the radius of the orbit is r, then the weight of the man measured in the rocket is equal to  A1 : *mg* A2 : GMm/r^2 A3 0	4.0	1.00

		: A4 : mv^2/r		
Objective Question				
21	21	Let $f(x,y)$ and $g(x,y)$ be two homogeneous functions of degree m and n respectively, where $m \neq 0$. Let $h = f + g$ and $x\frac{\partial h}{\partial x} + y\frac{\partial h}{\partial y} = 0$. Then, A1 : $f = \alpha g$ where α is a scalar. A2 : f is not proportional to g. A3 : $\frac{f}{g} = \frac{n}{m}$ A4 : $\frac{f}{g} = \frac{m}{n}$	4.0	1.00
Objective Question				
22	22	Consider the matrix $A = \begin{pmatrix} \mu & -1 & 0 & 0 \\ 0 & \mu & -1 & 0 \\ 0 & 0 & \mu & -1 \\ -6 & 11 & -6 & 1 \end{pmatrix}$, where μ is a scalar, not necessarily an integer. Determine the possible values of μ such that the rank of the matrix is 3. A1 : $0 < \mu < 4$ A2 : $1 < \mu < 3$ A3 : μ can have values 1, 2, or 3 only. A4 : $\mu = 3$ only.	4.0	1.00
Objective Question				
23	23	The area bounded by the parabola $x^2 = 4ay$ and the curve $y = \frac{8a^3}{x^2 + 4a^2}$ is A1 : $\left(2\pi - \frac{4}{3}\right)a^2$ A2 : $(2\pi)a^2$ A3 : $\left(\frac{4}{3}\right)a^2$ A4 : $\left(2\pi + \frac{4}{3}\right)a^2$	4.0	1.00

Objective Question				
24	24	A function $f(x)$ is defined by $f(x) = x^2 \sin\frac{1}{x}$ for $x \neq 0$ and $f(0) = 0$. Then, A1 : f(x) is continuous at x = 0 and differentiable at x = 0 A2 : f(x) is continuous at x = 0 and not differentiable at x = 0 A3 : f(x) is discontinuous at x = 0 A4 : f(x) is continuous everywhere except at x = 0	4.0	1.00
Objective Question				
25	25	The graph of the function y = f(x) is symmetrical about the line x = 2, then A1 : f(x + 2)= f(x – 2) A2 : f(2 + x) = f(2 – x) A3 : f(x) = f(-x) A4 : f(x) = - f(-x)	4.0	1.00
Objective Question				
26	26	A focus of an ellipse is at the origin. The directrix is the line x = 4 and the eccentricity is ½. Then the length of the semi-major axis is A1 : 4/3 A2 : 5/3 A3 : 7/3 A4 : 8/3	4.0	1.00
Objective Question				
27	27	Find the volume of the solid in the first octant bounded by the paraboloid. $z = 36 - 4x^2 - 9y^2$ A1 : $V = 27\pi$ A2 : $V = \frac{16}{9}$ A3 $V = 27$	4.0	1.00

		: A4 : $V = \frac{16}{9}\pi$		
Objective Question				
28	28	Let A = $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$. Then exp(A) is A1 : $\begin{bmatrix} e & e \\ e & e \end{bmatrix}$ A2 : $\begin{bmatrix} e & 0 \\ 0 & 2 \end{bmatrix}$ A3 : $\begin{bmatrix} 0 & e \\ e^2 & 0 \end{bmatrix}$ A4 : $\begin{bmatrix} e & 0 \\ 0 & e^2 \end{bmatrix}$	4.0	1.00
Objective Question				
29	29	What is the angle between x-axis and a force represented by $\hat{F} = 2\hat{i} + 3\hat{j} + 4\hat{k}$? A1 : $\cos^{-1}\frac{3}{\sqrt{29}}$ A2 : $\cos^{-1}\frac{4}{\sqrt{29}}$ A3 : $\cos^{-1}\frac{5}{\sqrt{29}}$ A4 : $\cos^{-1}\frac{2}{\sqrt{29}}$	4.0	1.00
Objective Question				
30	30	Radius of the second Bohr orbit of a singly ionised helium atom in A° is A1 : 1.06 A2 : 0.53 A3 : 0.265 A4 : 0.132	4.0	1.00
Objective Question				
31	31	In a stable nuclei, the number of neutron (N) is related to the atomic number (Z) in neutral atom is A1 $N = Z$	4.0	1.00

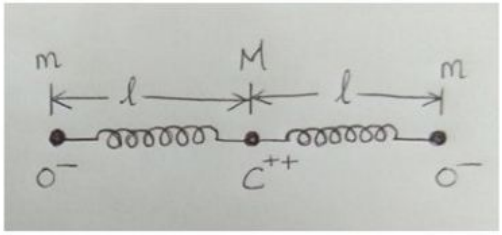
		: A2 : $\frac{n(n+1)}{2}$ A3 : $N \geq Z$ A4 : n		
Objective Question				
32	32	Consider an electron, a proton, and an alpha particle (a helium nucleus), each trapped separately in identical boxes. Which particle corresponds to the highest ground-state energy? A1 : proton A2 : electron A3 : alpha particle A4 : The ground-state energy is the same in all three cases	4.0	1.00
Objective Question				
33	33	When the principal quantum number is $n = 5$, how many different values of l and m_l, are possible? A1 : 5,7 A2 : 5,9 A3 : 4,9 A4 : 4,7	4.0	1.00
Objective Question				
34	34	A gas of identical diatomic molecules absorbs electromagnetic radiation over a wide range of frequencies. Molecule 1 is in the $J = 0$ rotation state and makes a transition to the $J = 1$ state. Molecule 2 is in the $J = 2$ state and makes a transition to the $J = 3$ state. The ratio of the frequency of the photon that excited molecule 2 to that of the photon that excited molecule 1 equal to A1 : 1 A2 : 2 A3 : 3 A4 4	4.0	1.00

		:		
Objective Question				
35	35	Which of the following is the correct daughter nucleus associated with the alpha decay of $^{157}Hf_{72}$? A1 : $^{153}Hf_{72}$ A2 : $^{153}Yb_{70}$ A3 : $^{157}Yb_{70}$ A4 : $^{157}Hf_{70}$	4.0	1.00
Objective Question				
36	36	An electron and a proton both moving at nonrelativistic speeds have the same de Broglie wavelength. Which of the following quantities are also the same for the two particles? A1 : momentum A2 : Kinetic energy A3 : frequency A4 : speed	4.0	1.00
Objective Question				
37	37	The minimum energy δE needed to separate a proton from a nucleus with Z protons and N neutrons is (M_H is the mass of a hydrogen atom) A1 : $(M_{Z-1,N} + 2M_H - 2M_{Z,N}) c^2$ A2 : $(M_{Z-1,N} - M_H + M_{Z,N}) c^2$ A3 : $(M_{Z+1,N} + M_H - M_{Z,N}) c^2$ A4 : $(M_{Z-1,N} + M_H - M_{Z,N}) c^2$	4.0	1.00
Objective Question				
38	38	In the decay scheme : ^AP_Z ------>$^AD_{Z-1}$ + ---------- + ---------- the blanks should contain (P and D represent the parent and daughter nuclei respectively) A1 : β+ and n A2	4.0	1.00

		: β- and π A3 : β- and p A4 : β+ and v		
Objective Question				
39	39	The reaction : $p \rightarrow \pi^{0} + e^{+}$ A1 : violates lepton number and baryon number conservation and hence does not occur A2 : conserves energy, mass and linear momentum and hence occurs A3 : violates charge conservation and hence does not occur A4 : conserves lepton, baryon numbers, charge, energy, mass and linear momentum and hence occurs	4.0	1.00
Objective Question				
40	40	The total spin of three particles with spins 1/2, 1 and 1 is A1 : an integer A2 : a half-integer A3 : Zero A4 : Three spins cannot be added	4.0	1.00
Objective Question				
41	41	If a process can occur via weak and electromagnetic interactions, it would end up being a A1 : weak interaction A2 : an electromagnetic interaction A3 : cannot determine A4 : both weak interaction and an electromagnetic interaction	4.0	1.00
Objective Question				
42	42		4.0	1.00

		For a nucleus of size ~ 10^{-13} cm the energy of the electron incident on the nucleus must be ~ --------- in order for the electron to probe the nucleus. A1 : 1 MeV A2 : 0.5 MeV A3 : 0.2 GeV A4 : 100 GeV		
Objective Question				
43	43	For the nuclear β- decay process : n -----> p + e-, apart from the lepton number violation, which of the following is violated ? A1 : Linear momentum A2 : energy A3 : baryon number A4 : angular momentum	4.0	1.00
Objective Question				
44	44	Eigen function of the operator d^2y/dx^2 is $\psi = 4e^{4x}$. Eigen value is A1 : 16 A2 : 4 A3 : 64 A4 : 1	4.0	1.00
Objective Question				
45	45	Petzval condition to remove the “curvature of field” aberration for two equi-curved lenses separated by a distance would be (n = refractive index, f = focal length of the lens) A1 : $n_1f_1 + n_2f_2 = 0$ A2 : $n_1f_1 - n_2f_2 = 0$	4.0	1.00

		A3 : $n_1f_2 + n_2f_1 = 0$ A4 : $n_1f_2 - n_2f1 = 0$		
Objective Question				
46	46	Visibility of interference pattern when two monochromatic coherent light sources with amplitude of one being five times that of the other will be A1 : 1/5 A2 : 1/25 A3 : 5/13 A4 : 2/5	4.0	1.00
Objective Question				
47	47	At certain time of the day, it is found that sunlight reflected from the freshwater lake (n=1.33) is completely polarized. What could be the angle of polarization? A1 : 56.3^o A2 : 33.7^o A3 : 53.1^o A4 : 38.9^o	4.0	1.00
Objective Question				
48	48	A left circularly polarised beam (λ_0 = 500nm) is incident normally on a calcite crystal (optic axis is cut parallel to surface) such that it introduces a phase shift of 3π. The emergent beam will be A1 : Right circularly polarized A2 : No change in the state of polarization A3 : Vertical linear polarization A4 : Horizontal linear polarization	4.0	1.00
Objective Question				
49	49	Randomly polarised light is incident on two crossed polarisers with 90^o between their transmission axes. A half-wave plate is inserted between the two polarisers such that its fast axis is 90^o to the transmission axis of the intensity I_o first polariser. The intensity of emergent light after second polarizer would be _____ fraction of the incident	4.0	1.00

		A1 : 1/2 A2 : 3/4 A3 : 0 A4 : 1/4		
Objective Question				
50	50	If the screen is kept at a distance of 2m with light source emitting at 500nm wavelength, illuminates the circular aperture of 10 mm radius, we observe _____ diffraction due to the object on the screen A1 : Fresnel A2 : Fraunhoffer A3 : Far-field A4 : No	4.0	1.00
Objective Question				
51	51	Consider a rotating spherical planet. The velocity of a point on its equator is V. The effect of rotation of the planet is to make g at the equator ½ of g at the pole. What is the escape velocity for a polar particle on the planet expressed as a multiple of V? A1 : V A2 : 2V A3 : 3V A4 : V/2	4.0	1.00
Objective Question				
52	52	A simple classical model of the CO_2 molecule would be a linear structure of three masses with the electrical forces between the ions represented by two identical springs of equilibrium length l and force of constant k, as shown in Fig.2. Assume that only motion along the original equilibrium line is possible, ie., ignore rotations. How many vibrational degrees of freedom does this system have? 	4.0	1.00

		A1 : 1 A2 : 2 A3 : 4 A4 : No vibrational degrees of freedom		
Objective Question				
53	53	A particle of mass m released from a height h falls under a gravity. Assuming that the resistance offered by the atmosphere is mkv^2, where k is a constant and v is the speed of the particle. The terminal speed of the particle is A1 : g/k A2 : $(gk)^{1/2}$ A3 : $(g/k)^{1/2}$ A4 : $(k/g)^{1/2}$	4.0	1.00
Objective Question				
54	54	$\nabla \log \lvert r \rvert$ will be equal to A1 : **r** A2 : $\mathbf{r}/r^3$ A3 : $\mathbf{r}/r^2$ A4 : $\mathbf{r}/r^4$	4.0	1.00
Objective Question				
55	55	A 3×3 matrix has eigen values 0, 2+i and 2-i. Which of the following is a correct statement? A1 : The matrix is Hermitian A2 : The matrix is unitary A3 : The inverse of the matrix exists A4 : det A = 0	4.0	1.00

Objective Question

56 | 56 | 4.0 | 1.00

List 1		List 2	
1	One dimensional heat equation	A	$\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$
2	Two dimensional heat equation	B	$\frac{\partial u}{\partial t} = \alpha^2 \left[\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right]$
3	Laplace equation	C	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$
4	Poisson's equation	D	$\nabla^2 \varphi = -\frac{\rho}{\varepsilon_0}$

A1 : 1-A, 2-B, 3-C, 4-D

A2 : 1-B, 2-A, 3-D, 4-C

A3 : 1-C, 2-D, 3-A, 4-B

A4 : 1-D, 2-C, 3-B, 4-A

Objective Question

57 | 57 | 4.0 | 1.00

Which of the following waves can be transmitted through solids, liquids and gases?

A1 : Transverse waves

A2 : Electromagnetic waves

A3 : Mechanical waves

A4 : Longitudinal waves

Objective Question

58 | 58 | 4.0 | 1.00

A cinema theatre has a volume of 750 m^2. What should be the total absorption in the theatre if the reverberation time of 1.5 seconds is to be maintained?

A1 : 835 open window units

A2 : 1125 open window units

A3 : 500 open window units

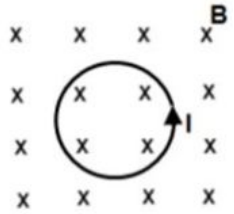
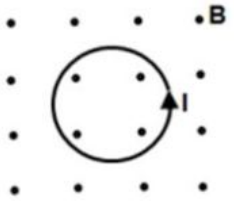
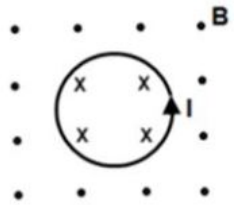
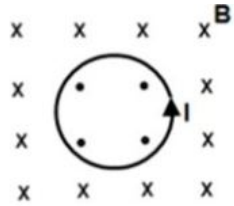
A4 : 750 open window units

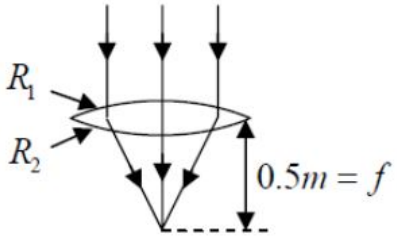
Objective Question

59 | 59 | 4.0 | 1.00

Statement: Sound wave cannot propagate through vacuum but light can
Reason: Sound wave cannot be polarised but light can

A1 Both statement and reason are true and reason is the correct explanation of the statement

		: A2 : Both statement and reason are true but reason is not the correct explanation of the statement A3 : Statement is true but reason is false A4 : Both statement and reason are false		
Objective Question				
60	60	Which of the following diagrams represents the magnetic field due to a circular current? A1 :  A2 :  A3 :  A4 :  	4.0	1.00
Objective Question				
61	61	A 200 turn coil having an axial length of 30 mm and a radius of 10 mm is pivoted in a magnetic field having a flux density of 0.8 T. If the coil carries a current of 0.5 A, the torque acting on the coil will be A1 : 8 Nm A2 : 0.48 Nm A3 : 0.048 Nm	4.0	1.00

		A4 : 0.0048 Nm		
Objective Question				
62	62	When sunlight is focused on a paper using a bi-convex lens, it starts to burn in the shortest time if the lens is kept 0.5m above it. If the radius of curvature of the lens is 0.75m then, the refractive index of the material is  A1 : 1.75 A2 : 1.25 A3 : 1.00 A4 : 0.5	4.0	1.00
Objective Question				
63	63	The melting of ice at 1 atmospheric pressure is A1 : 273.2 ^{o}K A2 : 0 ^{o}K A3 : 173.2 ^{o}K A4 : 373 ^{o}K	4.0	1.00
Objective Question				
64	64	Which one of the following statement is correct for an ideal gas A1 : Adiabatic compressibility is larger than the isothermal compressibility A2 : The isothermal compressibility is directly proportional to pressure A3 : Adiabatic compressibility is smaller than the isothermal compressibility A4 : Adiabatic compressibility is directly proportional to pressure	4.0	1.00

Objective Question				
65	65	The moment of inertia of a disc about one of its diameters is I_M. The mass per unit area of the disc is proportional to the distance from its centre. If the radius of the disc is R and its mass is M, the value of I_M is A1 : $1/2\ MR^2$ A2 : $2/5\ MR^2$ A3 : $3/10\ MR^2$ A4 : $3/5\ MR^2$	4.0	1.00
Objective Question				
66	66	In terms of the basic units of mass (M), length (L), time (T) and charge (Q), the dimensions of magnetic permeability of vacuum (μ0) are A1 : MLQ^{-2} A2 : ML^2T^{-1} A3 : LTQ^{-1} A4 : $LT^{-1}Q^{-1}$	4.0	1.00
Objective Question				
67	67	The rest energy of proton is 0.938 GeV. The kinetic energy of proton whose de Broglie wavelength of 1.0×10^{-15} m is A1 : 617 MeV A2 : 1.24 GeV A3 : 1.555 GeV A4 : 124 MeV	4.0	1.00
Objective Question				
68	68	Solar energy reaches the earth at the rate of about 1.4 KW per square meter of surface perpendicular to the direction of the sun (The mean radius of the earth's orbit is 1.5×10^{11} m). The mass of the sun decrease per second owing to this energy loss is A1 : 2.0×10^{30} Kg A2 : 4.4×10^{26} Kg	4.0	1.00

		A3 : 4.4×10^9 Kg A4 : 2.0×10^{19} Kg		
Objective Question				
69	69	The half-life of a radioactive nuclear source is 9 days. The fraction of nuclei which are left undecayed after 3 days is A1 : 7/8 A2 : 1/3 A3 : 2/3 A4 : $1/2^{1/3}$	4.0	1.00
Objective Question				
70	70	Which of the following excited states of a hydrogen atom has the highest lifetime? A1 : 2 p A2 : 2s A3 : 3s A4 : 3p	4.0	1.00
Objective Question				
71	71	The voltage resolution of a 12-bit digital to analog converter (DAC), whose output varies from -10 V to +10 V is, approximately A1 : 1 mV A2 : 5 mV A3 : 20 mV A4 : 100 mV	4.0	1.00
Objective Question				
72	72	The Miller indices of a plane passing through the three points having coordinates (0, 0, 1), (0,0,1) and (1/2,1/2,1/4) are A1 : (212)	4.0	1.00

		A2 : (111) A3 : (121) A4 : (211)		
Objective Question				
73	73	The electrical power output of a photodiode is maximum when a A1 : Small forward current flows through it, irrespective of the bias A2 : Small forward bias exists across it A3 : Large reverse bias exists across it A4 : Small reverse bias exists across it	4.0	1.00
Objective Question				
74	74	The efficiency of a full-wave rectifier is A1 : Same as half-wave rectifier A2 : double the half-wave rectifier A3 : one-half of half-wave rectifier A4 : one-third of half-wave rectifier	4.0	1.00
Objective Question				
75	75	A transistor has a collector current of 5 mA, when the emitter voltage is 20 mV. At 30 mV, the current is 30 mA. At 50 mV, it is A1 : 80 mA A2 : 280 mA A3 : 480 mA A4 : 1080 mA	4.0	1.00
Objective Question				
76	76	Which of the following is used in atomic clocks?	4.0	1.00

		A1 : Laser A2 : Quartz A3 : Maser A4 : Helium		
Objective Question				
77	77	Which planet can never be seen on the meridian at midnight A1 : Jupiter A2 : Mercury A3 : Saturn A4 : Mars	4.0	1.00
Objective Question				
78	78	The lattice parameter and density for an fcc lattice of copper are 3.60 Å and 9055 kg/m^3 respectively. If the atomic weight of copper is 63.6, the number atoms per unit cell is A1 : 4 A2 : 6 A3 : 8 A4 : 12	4.0	1.00
Objective Question				
79	79	The degeneracy of the quantum states with $(n_x^2 + n_y^2+n_z^2) = 6$ is A1 : 12 A2 : 24 A3 : 48 A4 : 8	4.0	1.00

Objective Question				
80	80	At 0 K, the probability of finding an electron at energy level E is unity, when A1 : $E = E_F$ A2 : $E > E_F$ A3 : $E < E_F$ A4 : $E >> E_F$	4.0	1.00
Objective Question				
81	81	The net magnetic moment of Fe atom in BCC crystal (a = 2.857 Å) is 2.2 μ_B. The saturation magnetization of Fe at 0 K is A1 : 100 kA m^{-1} A2 : 1750 kA m^{-1} A3 : 2500 kA m^{-1} A4 : 3520 kA m^{-1}	4.0	1.00
Objective Question				
82	82	The phase difference between the input and output voltages of a transistor connected in common emitter arrangement is A1 : 360^o A2 : 180^o A3 : 90^o A4 : 270^o	4.0	1.00
Objective Question				
83	83	In the triode region, the I_D-V_{DS} characteristics of a MOSFET are A1 : Hyperbolic A2 : linear A3 quadratic	4.0	1.00

		: A4 : exponential		
Objective Question				
84	84	The wavelength of radiation emitted by an LED made up of a semiconducting material with band gap energy 2.8 eV A1 : 2.8 Å A2 : 4.3308 Å A3 : 5548.4 Å A4 : 4430.8 Å	4.0	1.00
Objective Question				
85	85	In ionic solid if the radius of anion is r_a and of cation is r_c, then bond length is A1 : $r_c + r_a$ A2 : $\sqrt{3}(r_c + r_a)$ A3 : $\sqrt{3}/2(r_c + r_a)$ A4 : $r_c - r_a$	4.0	1.00
Objective Question				
86	86	Calculate the energy difference between the two levels for which $n_x=n_y=n_z=1$ and the next higher level for the free electron in a solid cube of side 10 mm A1 : 1.13 x 10^{-14} eV A2 : 4.46 x 10^{-15} eV A3 : 5.86 x 10^{-14} eV A4 : 9.04 x 10^{-13} eV	4.0	1.00
Objective Question				
87	87	The fraction of electrons excited across the energy gap in Germanium (E_g = 0.7 eV) at room temperature (300 K) is A1 : 7 x 10^{-18}	4.0	1.00

		A2 : 1.7×10^{-12} A3 : 4×10^{-12} A4 : 1.3×10^{-6}		
Objective Question				
88	88	A half-wave rectifier is supplied with an AC supply of 120 V at 60 Hz through a step-down transformer having a turn ratio of 10:1. By assuming an ideal diode is used, the output DC voltage of diode is A1 : 5.40 V A2 : 7.8 V A3 : 8.5 V A4 : 3.3 V	4.0	1.00
Objective Question				
89	89	A differential amplifier has an open-circuit voltage gain of 100. This amplifier has a common input signal of 3.2 V to both terminals and it results in an output signal of 26 mV, the CMRR is A1 : 81.8 dB A2 : 55.4 dB A3 : 23.4 dB A4 : 36.7 dB	4.0	1.00
Objective Question				
90	90	Laser-produced plasma consisting of a 50 μm diameter ball of radiates very strongly at a wavelength of 5 nm. At a distance of 0.75 m from the source, the spatial coherence resulting from light emitted from opposite sides of the plasma is A1 : 5×10^{-5} m A2 : 0.55×10^{-5} m A3 : 1.2×10^{-5} m A4 : 7.5×10^{-5} m	4.0	1.00
Objective Question				

91	91	Consider the two-level system with E_1 = -13.6 eV, E_2 = -3.4 eV and the co-efficient A_{21}= 6 x 10^8 s^{-1}. The frequency of light emitted due to transition from E_2 and E_1 is A1 : 8.2 x 10^{17} Hz A2 : 4.5 x 10^{16} Hz A3 : 2.5 x10^{15} Hz A4 : 6.5 x 10^{14} Hz	4.0	1.00
Objective Question				
92	92	The ratio of spontaneous emission to stimulation emission for a cavity of temperature 50 K and wavelength of 10^{-5} m is A1 : 3.218 x 10^{10} A2 : 3.218 x 10^{12} A3 : 3.218 x 10^{14} A4 : 3.218 x 10^{16}	4.0	1.00
Objective Question				
93	93	A Michelson interferometer is used to determine the apparent diameter of a star. The fringe pattern disappears when the adjustable mirrors are at a separation of 10 m and wavelength of light used is 7 x 10^{-4} mm. The angular diameter of the star is A1 : 8.54 x10^{-8} radians A2 : 3.54x10^{-9} radians A3 : 1.34 x10^{-8} radians A4 : 1.22 x10^{-8} radians	4.0	1.00
Objective Question				
94	94	The proton proton chain reaction A1 : produces chains of protons which are then broken apart to produce the Sun's energy A2 : is a three-step process which converts some mass to energy as helium nuclei are formed A3 : is the runaway reaction that produces the fission of iron during a supernova explosion	4.0	1.00

		A4 : adds protons together until a massive carbon nucleus is produced at the core of the Sun		
Objective Question				
95	95	Which of the following is not included in the internal energy of a macroscopic system made up many particles? A1 : Kinetic energy of particles A2 : Interaction between the particles A3 : Potential energy of the particles A4 : Kinetic energy of the centre of mass of the system	4.0	1.00
Objective Question				
96	96	The energy value printed in food products such as chocolates correspond to which of the following thermodynamic potential? A1 : Internal energy A2 : Helmholtz free energy A3 : Enthalpy A4 : Gibbs free energy	4.0	1.00
Objective Question				
97	97	Two identical vessels, one containing one kilogram of ice and the other one kilogram of water both at 0^oC, are placed in a room. If the temperature of the water raised by 10^oC in one hour, how much time does it take for the total ice to melt? A1 : 2 hours A2 : 4 hours A3 : 8 hours A4 : 10 hours	4.0	1.00
Objective Question				
98	98	A gaseous system obeys van der Waal's equation of state $\left(P+\frac{a}{V^2}\right)(V-b)=RT$. The temperature corresponding to critical point is A1 : $T_C = 8a/27b$	4.0	1.00

		A2 : $T_C = 27a/8b$ A3 : $T_C = 4a/9b$ A4 : $T_C = 4a/27b$		
Objective Question				
99	99	Thermodynamic state of a magnetic system is described by magnetization (M), magnetic field (H) and temperature (T) and the equation of state is M = k H/T, where k is a constant. In an isothermal process, if magnetization is increased from M to 2M, the work done by the gas is proportional to A1 : M^2 A2 : $1.5\ M^2$ A3 : $2M^2$ A4 : $4M^2$	4.0	1.00
Objective Question				
100	100	A Carnot engine works between 1000 K and T and another Carnot engine works between T and 500 K. If both engines do the same work, the value of T is A1 : 800 K A2 : 1250 K A3 : 750 K A4 : 1150 K	4.0	1.00