(Total No. of printed pages: 20)

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10301 Sr. No	(PG-EE-2015) Subject: PHYSICS	Code A
Time: 11/4 Hours	Max. Marks: 100	Total Questions: 100
Roll No.	_ (in figure)	(in words
Name:	Father's Name : _	
Mother's Name	Date of Ex	xamination
(Signature of the candidat	e) (i	Signature of the Invigilator
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- All questions are compulsory.
- 2. The candidates must return the Question book-let as well as OMR answer-sheet to the Intiglator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
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- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
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Question No.	anoma, Questions	ug W	
1.	For a conservative system, generalized force	,0	
	(1) has necessarily the dimensions of force		
	(2) is a dimensionless quantity		
93707	(3) can not have dimensions of force		
	(4) may have dimensions of torque	Q.	
2.	Mutual interaction forces between two particles can change		
	(1) the linear momentum but not the kinetic energy		
	(2) the kinetic energy but not the linear momentum		
	(3) the linear momentum as well as kinetic energy		
	(4) neither the linear momentum nor the kinetic energy		
3.	If the Lagrangian does not depend on time explicitly		
	(1) the Hamiltonian is constant		
	(2) the Hamiltonian can not be constant		
	(3) the kinetic energy is constant		
	(4) the potential energy is constant		
4.	The ecentricity (e) of the orbit of a satellite having maximum and minimal velocities as v_1 and v_2 is	num	
	(1) $\frac{v_1}{v_2}$ (2) $\frac{v_2}{v_1}$		
	(3) $\frac{v_1 - v_2}{v_1 + v_2}$ (4) $\frac{v_1 + v_2}{v_1 - v_2}$		
5.	For a one dimensional oscillator, the representative point in dimensional phase space traces	two	
	(1) an ellipse (2) a parabola		
	(3) a hyperbola (4) always a straight line		

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Question No.	Questions
6.	For a particle at rest in a rotating frame, the pseudo force acting on it is
	(1) zero (2) only centrifugal force
	(3) only coriolis force (4) both centrifugal and coriolis force
7.	If constraint forces do work and total mechanical energy is not conserved then constraints are named as
	(1) bilateral constraint (2) unilateral constraint
	(3) dissipative constraint (4) regenerative constraint
8.	A force $\vec{F} = -\vec{\nabla} u$ is said to be conservative if
	(1) grade F is zero (2) div F is zero
	(3) Curl F is zero (4) none of three before
9.	Which of the following is not an explicit function of time
	(1) velocity (2) momentum
	(3) acceleration (4) potential energy
10.	If external torque on a system is zero, then its angular velocity
	(1) remains unchanged only if moment of inertia changes
	(2) changes only if moment of inertia remains unchanged
	(3) remains unchanged only if moment of inertia remains fixed
	(4) none of the three before
11.	A pair is constrained to move along the inner surface of a hemisphere, then the number of degrees of freedom of the particle is
	(1) one (2) two
	(3) four (4) three
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Question No.	Questions deliberations of the control of the contr
12.	For a conservative system, the potential energy is (1) coordinate and velocity dependent (2) coordinate dependent and velocity independent (3) coordinate independent and velocity dependent (4) coordinate and velocity independent
13.	The distance time graph of a particle at time t makes an angle 45° with respect to time axis. After one second, it makes angle 60° w.r.t. to time axis, what is the acceleration of the particle (1) $\sqrt{3} - 1$ unit (2) $\sqrt{3} + 1$ unit (3) $\sqrt{3}$ unit (4) 1 unit
14.	A ball kept in a box (closed), moves in the box colliding with the walls. If the box is kept on a smooth surface, the centre of mass of the (1) box remains constant (2) box and the ball system remains constant (3) ball remains constant (4) ball relative to the box remains constant
15.	Centre of mass of a semicircular plate of radius R, the density of which linearly varies with distance being d at the centre to 2d at the circumference is
-26, -880%	(1) ${}^{3}R_{/\pi}$ from the centre (2) ${}^{4}R_{/3\pi}$ from the centre (3) ${}^{5}R_{/\pi}$ from the centre (4) ${}^{7}R_{/5\pi}$ from the centre
16.	A uniform rod is placed vertically on a smooth surface and then released. Then (1) the centre of rod follows a straight line path (2) the centre of mass follows circular path (3) the instantaneous axis is passing through the point of contact (4) all the three before

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then after (1) mov	or decay, the centre of more on a straight line ain at rest dulums of length ℓ_1 and	(2) (4)	e parent nucleus is initially at rest, will move in a circle follow a parabolic path
(3) rem	dulums of length $\ell_{_1}$ and		follow a parabolic path
two are in of the sh		me p vo w n.]	art vibrating. If at some instant, the hase, then after how many vibrations ill be in phase in the mean position 10
of 4 second 0.125 time oscillation	nd. The sphere is completed that the brass. If the sphere is completed that the brass is the time period will	the s	n a massless spring has a time period immersed in a liquid having density phere remains in the liquid during
	cond cond		2 second 4.75 second
20. A particl of the pa (1) not (3) S.H	rticle is S.H.M	(2) (4)	ented as y = 3 + 4 cos wt. The motion Oscillatory but not S.H.M rotatory
	ng constant k of a wir		length L, having an area of cross- ving as a spring is
$(1) \frac{\text{YA}}{\text{L}}$	The state of the same	(2)	$\frac{\mathrm{YA}}{\mathrm{2L}}$
$(3) \frac{2YA}{L}$	Appropriate the pol	(4)	YL A

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Question No.	2470	Questions	Juestion Superior No. 4%
22.	The dimensions of Poisso	n's ratio are	agoronie system
	(1) [M° L° T°]	(2) $[M L^{-1} T^{-2}]$	
	(3) $[M L^2 T^{-4}]$.	(4) $[M L^2 T^{-3}]$	
23.	The temperature at which	h the phase transition occurs dep	ends upon
	(1) pressure	(2) volume	
	(3) density	(4) mass	
24.		which the rms velocity of its mol the nitrogen molecules at 300 k i	
interes	(1) 2100 k	(2) 1700 k	
	(3) 1350 k	(4) 1050 k	
25.	How many cylinders of hy fill a balloon of volume 50 0.05 m³ at an absolute pre	drogen at atmospheric pressure a 00 m³, if the hydrogen is stored essure of 15 × 10 ⁵ Pa?	are required to in cylinders of
	(1) 700	(2) 675	
	(3) 605 A A A A A A A A A A A A A A A A A A A	(4) 710	
26.	If the temperature of 3 m change in internal energy	oles of helium gas is increased b	y 2k, then the
	(1) 70.0 J	(2) $68.2 J$	
dramail.	(3) 74.8 J	(4) 78.2 J	1) 11 nb
27.	One mole of a gas isobaric ratio of specific heats of th	ally heated by 40 k receives heat he gas is	1.162 kJ. The
	(1) 1.7	(2) 1.4	
	(3) 1.3	(4) 1.5	(8)
	RNJ was in		

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Question No.	anolites Questions noites of
28.	A carnot engine first operates between 200°C and 0°C and then between 0°C and 200°C. The ratio of efficiencies (η_2/η_1) in two cases is
TRI MOL	(1) 1:15 (2) 1:1 (3) 1:2 (4) 1.73:1
29.	The propagation of heat in air takes place by (1) conduction (2) convection
s seven,	(3) radiation (4) all the three before
30.	The ratio of rate of radiation of energy by two spheres of same material having radii r and 4r and temperature $2T_0$ and T_0 respectively is
o) best	(1) 1:1 (2) 1:2
to every	(3) 2:1 (4) 3:1 (5) (4) (5) (6) (6) (6) (6) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7
31.	The shortest height of a vertical mirror required to see the entire image of a man, will be
	(1) $\frac{1}{3}$ of man's height (2) $\frac{1}{2}$ of man's height
	(3) $\frac{2}{3}$ of man's height (4) equal to man's height
32.	If 'C' is the velocity of light in vacuum, then the time taken by the light to travel through a glass plate of thicknesss 't' and refractive index ' μ ' is
on T. Jo	(1) $t_{\mu C}$ (2) $t_{\mu C}$
	(3) $\mu t/C$ (4) tC/μ
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Question No.	Anolisos Questions noilesses
33.	A thin prism of angle 6° made of glass of refractive index 1.5 is combined with another prism of glass with $\mu = 1.75$ so as to produce dispersion without deviation. The angle of second prism is
	(1) 7° (2) 4.67°
	(3) 9° (4) 5°
34.	A simple microscope consists of a concave lens of power -10 D and a convex lens of power $+20$ D in contact. If the image formed is at infinity, then the magnifying power (D = 25 cm) is
	(1) 2.5 (2) 3.5
	(3) 2.0 (4) 3.0
35.	A symmetric double convex lens is cut in two equal parts along its diameter. If the power of original lens was 4D, the power of divided lens will be
	(1) 2D (2) 3D and of the bloom
	(3) 4 D (4) 5 D
36.	If the resolution limit of the eye is 1 minute and at a distance x km from the eye, two persons stand with a lateral seperation of 3 meters, then value of x for which the two persons can be resolved by naked eye is
ed) nie	(1) 10 km (2) 15 km
Thursday,	(3) 20 km (4) 30 km
37.	If the Young's double slite experiment is performed in water, then
	(1) the fringe width decreases (2) the fringe width increases
	(3) the fringe width does not change (4) there will be no fringes
38.	If n coherent sources of intensity \boldsymbol{I}_0 are super imposed at a point, the intensity of the point is
	(1) $n I_0$ (2) $n^2 I_0$
	(3) $n^3 I_0$ (4) I_0/n

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Question No.		Que	stions	neitzen) No.
39.	In Fresel's biprism ex is 4 m. The angle of the glass of the biprism is 15×10^{-4} m. The num	e prism is 2×1.5 . The fr	10 ⁻³ radian and the r	ofractive index of
	(1) 3 (3) 6	(2)	2	
40	The word to seed by	(4)	8	
40.	If σ is surface charge d of σ_{\in} are same as	ensity and ∈ i	s electric permittivity	y, the dimensions
	(1) electric force	(2)	electric field intens	sity
34)	(3) pressure	(4)	charge	
41.	A small element ℓ is cultural unit length. The net element (1) zero	ectric field at	lar ring of radius 'a'; the centre of the rin $\frac{\lambda \ell}{4\pi \epsilon_0} a^2$ $\frac{\lambda}{4\epsilon\pi \ell}$	and λ charge per g will be
a si	(3) ∞	(4)	$\sqrt[4]{4 \in \pi \ell}$	
42.	An electron is projected horizontal in a region upwards. The maximum level will be	of uniform e	electric field of 5000	N/C vertically
8088.00	(1) 14.2 mm	(2)	15 mm	
	(3) 12.6 mm	(4)	14.2 cm	on laying tight
43.	A surface $S = 10\hat{j}$ is key flux through the surface	pt in an electr e will be	ic field $E = 2\hat{i} + 4\hat{j} + \hat{j}$	7 k̂ . The electric
	(1) 40 units	(2)	50 units	a (t)
	(3) 30 units	(4)	20 units	
		1-7		Snow

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Question No.	Questions notice			
44.	Two drops of water each with a charge of 3×10^{-9} C having surface potential 500 V form a single drop. The surface potential of the new drop is			
	(1) 794 V (2) 1000 V			
	(3) 250 V (4) 750 V			
45.	The electric field intensity at a point at a distance 20 cm on a line making an angle 45° with the axis of a dipole of moment 10 C – m is			
	(1) $1.77 \times 10^{13} \text{ V/m}$ (2) $0.177 \times 10^{13} \text{ V/m}$			
bill	(3) $17.7 \times 10^{13} \text{ V/m}$ (4) $177 \times 10^{13} \text{ V/m}$			
46.	Two capacitors A and B having capacitance 10 µF and 20 µF respectively are connected in series with a 12 V battery. The ratio of charges on A and B is (1) 0.5:1 (2) 1:1 (3) 2:1			
47.	The force acting upon a charged particle kept between the plates of a charged capacitor is F. If one of the plates of the capacitor is removed, force acting on the same particle will be (1) 0 (2) F/			
	(1) 0 (2) F/2			
	(3) F (2) (4) 2 F (3) (5) (6) (7)			
48.	A 5°C rise in temperature is observed in a conductor when current is passed through it. If the current is doubled, the rise in temperature will be approximately			
48.	passed through it. If the current is doubled, the rise in temperature will			

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Question No.	Questions Questions
49.	A current 0.5 A flows through a resistance 2 Ω connected across a cell. The current changes to 0.25 A as resistance is increased to 5 Ω . The emf of the cell is (1) 1 V (2) 1.5 V (3) 2 V (4) 2.5 V
50.	Two heater coils of same material are connected in parallel across the mains and the length and diameter of one coil is double that of the other. Which one will produce more heat (1) thinner coil (2) thicker coil (3) both will produce same amount of heat (4) can't predict
51.	If a charged particle moving in a uniform magnetic field looses 4% of its kinetic energy, radius of curvature of its path changes by (1) 2% (2) 4% (3) 10% (4) 7.5%
52.	A length ℓ of a wire is bent to form a circular coil of some turns. A current I is passed through it and it is placed in a magnetic field B. The maximum torque acting on the coil is
	(1) $1 B \ell^2$ (2) $4 \pi I B \ell^2$ (3) $I \ell^2 B_{4\pi}$ (4) zero
53.	An atom is paramagnetic if it has (1) an electric dipole moment (2) no magnetic moment (3) a magnetic moment (4) no electric dipole moment
54.	The couple acting on a magnet of length 10 cm and pole strength 15 Am kept in a filed $B = 2 \times 10^{-5}$ T at an angle of 30° is (1) 1.5×10^{-5} Nm (2) 1.5×10^{-3} Nm
	(3) $1.5 \times 10^{-2} \text{ Nm}$ (4) $1.5 \times 10^{-6} \text{ Nm}$

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Question No.	Questions
55.	A fan blade of length $1/\sqrt{\pi}$ meter rotates with a frequency 5 cycles/sec
f 45°	perpendicular to a magnetic field 10 tesla. The potential difference between the centre and end of the blade is
7	(1) -50 V (2) $+50 \text{ V}$
ding IIs	(3) -2.0 V (4) $+0.02 \text{ V}$
56.	The self inductance of an air core solenoid of 80 cm length and 500 turns each of circular cross-section with 2 cm diameter is
	(1) 150.6 μH (2) 162.2 μH
nishtag	(3) 123.3 μH (4) 102.5 μH (5)
57.	An a.c. source $V = 100 \sin 100 \pi t$ is connected to a resistor of 20 Ω . The rms value of current through the resistor is
engle of	(1) 10 A (2) $\frac{10}{\sqrt{2}}$ A (3)
68.	(3) $\frac{5}{\sqrt{2}}$ A (4) $\frac{7}{\sqrt{2}}$ A
58.	A voltage signal is represented as $V = 220\sqrt{2} \cos{(50\pi)} t$. How many times will the current be zero in one second
20 3	(1) 50 (2) 100
	(3) 33 (4) 67
59.	The reactance of a capacitor (10 pF) connected across a d.c. source is
OSA TOP	(1) zero (2) infinity
	(3) $10^4 \Omega$ (4) $10^7 \Omega$
	*Of × 0.6 (0) *Of × 6.6 (6)

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Question No.	Ques	tions			
60.	are an intermediate the less of that	c field 'B' in an electromagnetic wave (2) inclined at an angle of 45° (4) opposite to each other			
61.	The average power per unit area at emitting 20 W of EM radiations unif	a distance of 2 m from a small bulb formally in all directions is			
	(1) 0.69 W/m^2	$0.56\mathrm{W/m^2}$			
	(3) 0.78 W/m^2 (4)	0.39 W/m ²			
62.	The ratio of wavelengths associated accelerated through same potential	with a proton and an alpha particle is			
	(1) 2	$\sqrt{2}$ the matter and a result of $\sqrt{2}$			
	(3) 4 (4)	$\frac{1}{2\sqrt{2}}$			
63.	The momentum of a photon with energy is	ergy equal to rest energy of an electron			
	(1) zero (2)	$2.73 \times 10^{-2} \ \mathrm{kg \ ms^{-1}}$			
sauri) yn	(3) $1.99 \times 10^{-24} \text{ kg ms}^{-1}$ (4)	infinite			
64.	The graph between frequency of inci	ident light and the stopping potentia			
	(1) parabola (2)	straight line			
at see	(3) hyperbola (4)	circle			
65.	A ruby laser produces radiations of 662.6 nm pulses of duration 10 ⁻⁹ sec If the energy/pulse is 0.39 J, the numbr of photons produced are				
	(1) 1.3×10^9 (2)	1.3 × 10 ¹⁸			
		3.9×10^{18}			

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Question No.	Questions Questions					
66.	001	minion kill.	approach, th How long wil to Earth in th	1 it take	ance between Mars e to send a radio me ation ?	and the Earth is
	(1)	5 sec		(2)	200 sec	
	(3)	0.2 sec		(4)	500 sec	1.01 (1) 19.1
67.	Hov	v many diffe rogen samp	erent wavelen	igths m	ay be observed in the	e spectrum from a
	(1)	3		(2)	The second secon	
	(3)	5		(4)	6	
68.					e longest waveleng	
					1216 A°	
69.	z com	nponent of a	n orbital angu	ılar mo	mentum is h/π , its m	nagnetic quantum
	(1)				2 Windanowski	day (8)
181180 49	(3) -				O made made to make	
70.	If the	uncertaini	ity in the pos	ition of	a particle is equal ity in the velocity w	4- 1- 1- D
	(1)			t	$\frac{v}{4\pi}$	18g (E)
	(3)	$4\pi m$		(4)	$\frac{mv}{4\pi}$	lou (i)

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Question No.	Questions				
71.	If the binding energy/nucleon in Li ⁷ and He ⁴ nuclei are 5.60 MeV and 7.06 MeV respectively, the energy of the reaction				
	$\text{Li}^7 + \text{p} \rightarrow 2\text{He}^4$ will be				
	(1) 19.6 MeV (2) 2.4 MeV				
	(3) 8.4 MeV (4) 17.28 MeV				
72.	The count rate of a radioactive nuclei falls from 992 counts/minute to 62 counts/minute in 10 hour. The half-life of the element is				
	(1) 1 hour (2) 2.5 hours				
	(3) 5 hours (4) 6 hours				
73.	The nucleus ²⁴² Pu ₉₄ decays to ²⁰⁶ Pb ₈₂ by emitting				
	(1) 9α and 12β particles (2) 6α and 9β particles				
	(3) 9α and 6β particles (4) 6α and 12β particles				
74.	On an atomic scale, which of the following polarisation is important?				
	(1) electronic only (2) ionic only				
	(3) orientational only (4) both ionic and orientational				
75.	At a frequency less than the plasma frequency, the collision losses cause				
. silporti	(1) total internal reflection				
	(2) wave attenuation				
	(3) partial reflection				
	(4) both attenuation and partial reflection				
	A				

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Question No.	another Questions actions
76.	The minimum energy possessed by a particle confined to a one dimensional box of length L is
	(1) 0 (2) $\frac{h^2}{(8\pi^2 \text{ m L}^2)}$
	(3) $\frac{\hbar^2}{(8\pi^2 \mathrm{m}\mathrm{L}^2)}$ (4) $\frac{\mathrm{mv}^2}{2\mathrm{L}}$
77.	The width of the spectral line resulting when an atom in an excited state of life time 10 ⁻⁸ sec. returns to the ground state is
	(1) 0.33 m^{-1} (2) 0.33 cm^{-1}
to sulm	(3) 33 m ⁻¹ (4) 33 cm ⁻¹
78.	The expected value of P for the wave function $\psi(x) = \sqrt{\frac{2}{L}} \sin \frac{\pi x}{L}$; $0 < x < L$
	is
	(1) 0 (2) 1/2
	(3) 1 (4) infinity
79.	The particles described by anti symmetric wavefunctions obey
	(1) Maxwell Boltzmann Statistics (2) Bose-Einstein Statistics
	(3) Fermi-Dirac Statistics (4) All the three before
80.	Born approximation can be used
	(1) only within very low energy limits
	(2) only within high energy limits
	(3) in both very low as well as high energy limits
	(4) none of the three before

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Question No.	Questions				
81.		g takes place, then the ratio of the cross-section classically for t			
	(1) 2	(2) (2) 4			
	(3) $\frac{1}{2}$	(2) 4 (4) $\frac{1}{4}$			
82.	The Stern-Gerlach experim	ent proves the existance of			
edané bi	(1) electronic charge	(2) electronic depole mo	oment		
	(3) electronic spin	(4) electron mass			
83.	For the wavefunction $\psi_n = 1$ normalization constant is	A $\sin \frac{n \pi x}{a}$ confined to $0 < x <$	a, the value of		
	$(1) \sqrt{\frac{2}{a}}$	$(2) \sqrt{\frac{a}{2}}$	5		
	$(3) \frac{2}{a}$	$(4) \frac{a}{2}$			
84.	Entropy of the universe tends to be				
	(1) minimum	(2) zero			
	(3) constant	(4) increasing always			
85.	The internal energy of an isolated system				
	(1) remains constant	(2) is zero			
	(3) infinite	(4) none of the three be			

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Question No.	Questions					
86.	The number of degrees of freedom of a gas is F, then the value of γ is					
	(1) $1 + \frac{2}{F}$ (2) $\frac{2}{F}$ (30.0 (1)					
	(3) $\frac{F}{2} + 1$ (4) zero (4) zero (5)					
87.	The work done when a gram-molecule of a gas expends isothermally at 27°C to double it original volume is [R = 8.3 J k ⁻¹ mole ⁻¹]					
	(1) 725.8 Joule (2) 1725.8 Joule					
10.	(3) -725.8 Joule (4) zero					
88.	In quantum statistics, the value of occupation index is					
	(1) equal to 1 (2) equal to or greater than 1					
	(3) equal to or less than 1 (4) less than 1					
89.	The specific heat of saturated steam is always					
	(1) positive (2) zero					
	(3) negative (4) infinite					
90.	The unit of entropy is					
	(1) J k (2) J k ⁻¹					
	(3) J (4) N m ⁻²					
91.	As the interatomic distance in a solid increases, the width of an allowed energy band					
	(1) increases (2) decreases					
	(3) is unchanged (4) first increases then decreases					

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Question No.	Questions					
92.	The atomic packing factor for a bcc metal structure is					
	(1) 0.68 (2) 0.74					
	(3) 0.50 (4) 1.00					
93.	Which of following reveal crystallographic structure of a solid?					
laa ya	(1) α-rays (2) β rays					
	(3) γ rays (4) X rays					
94.	The 1st brillouin zone of simple cubic lattice is					
	(1) rhombic decahedron (2) truncated octahedron					
188	(3) parallelopiped (4) cube					
95.	Bipolar logic families employ					
	(1) junction field effect transistor (2) p-n junctions					
	(3) n-p-n transistors (4) MOSFETs					
96.	A Schottky transistor when used as a switch switches between					
	(1) cut-off and saturation regions					
	(2) cut-off and active regions					
	(3) active and saturation regions					
bewo.	(4) different operating points in active region					
97.	The most commonly used configuration of a transistor as a switch is					
	(1) CB (2) CC					
	(3) CE (4) CB or CC					

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Question No.	Questions					
98.	Which of the following diodes is used for fastest switching					
	(1)	p-n junction	(2)	Schottky		
	(3)	Vacuum	(4)	Zener		
99.	The	time required to go	from ON to	OFF in a p-n junction diode is equa		
	(1)	zero	(2)	switching time		
	(3)	transition time	(4)	storage time		
100.	In c	ase of a MOSFET, th	e gate curre	ent		
	(1) is negligibly small					
	(2) increases with increase in drain voltage					
	(3) decreases with decrease in drain voltage					
	(4) is dependent on drain current					
No.						

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(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
- 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
- 4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let.
- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- Use only Black or Blue <u>BALL POINT PEN</u> of good quality in the OMR Answer-Sheet.
- 7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Head Department of Physics M.D. University, Rohtak SE.

Question No.	annileou Questions no lead of
1.	A pair is constrained to move along the inner surface of a hemisphere, then the number of degrees of freedom of the particle is
	(1) one (2) two
10	(3) four (4) three
2.	For a conservative system, the potential energy is
den da	(1) coordinate and velocity dependent
	(2) coordinate dependent and velocity independent
	(3) coordinate independent and velocity dependent
1.1	(4) coordinate and velocity independent
3. ont tos sheitand motticod	The distance time graph of a particle at time t makes an angle 45° with respect to time axis. After one second, it makes angle 60° w.r.t. to time axis, what is the acceleration of the particle (1) $\sqrt{3} - 1$ unit (2) $\sqrt{3} + 1$ unit
	(3) $\sqrt{3}$ unit (4) 1 unit
4. Beitean	A ball kept in a box (closed), moves in the box colliding with the walls. If the box is kept on a smooth surface, the centre of mass of the (1) box remains constant
daimb i	(2) box and the ball system remains constant
	(3) ball remains constant
	(4) ball relative to the box remains constant
5.	Centre of mass of a semicircular plate of radius R, the density of which linearly varies with distance being d at the centre to 2d at the circumference is
	(1) ${}^{3}R_{\pi}$ from the centre (2) ${}^{4}R_{3\pi}$ from the centre
	(3) ${}^{5R}\!/_{\pi}$ from the centre (4) ${}^{7R}\!/_{5\pi}$ from the centre
	1.0

(1)

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Question No.	2Holiza of Questions				
6.	A uniform rod is placed vertically on a smooth surface and then released. Then				
	(1) the centre of rod follows a straight line path				
	(2) the centre of mass follows circular path				
	(3) the instantaneous axis is passing through the point of contact				
	(4) all the three before more and more evidence and the second of the se				
7.	In case of a radioactive decay, if the parent nucleus is initially at rest, then after decay, the centre of mass will				
	(1) move on a straight line (2) move in a circle				
	(3) remain at rest (4) follow a parabolic path				
8.	Two pendulums of length ℓ_1 and ℓ_2 start vibrating. If at some instant, the two are in mean position in the same phase, then after how many vibrations of the shorter pendulum, the two will be in phase in the mean position $[\ell_1, > \ell_2; \ell_1 = 121 \text{ cm. } \ell_2 = 100 \text{ cm.}]$ (1) 11 (2) 10				
NY 11.00	(3) 9 y gnibillos xod ode in sevo (4) (8 cols) xod a ni iqeal flad A				
11 21127	although the property and analysis of the second six and self-				
9.	A solid copper sphere suspended from a massless spring has a time period of 4 second. The sphere is completely immersed in a liquid having density 0.125 times that the brass. If the sphere remains in the liquid during oscillations, the time period will be				
	(1) 4 second (2) 2 second				
doidw l	(3) 3 second (4) 4.75 second				
10.	A particle moves along y axis represented as $y = 3 + 4 \cos wt$. The motion of the particle is				
	(1) not S.H.M (2) Oscillatory but not S.H.M				
	(3) S.H.M (4) rotatory				
	(-) 1000001				
	A				

(2)

Question No.	enomes Questions	oitsau
11.	As the interatomic distance in a solid increases, the width of an all energy band	lowed
	(1) increases (2) decreases	
	(3) is unchanged (4) first increases then decreases	3
12.	The atomic packing factor for a bcc metal structure is	.01
	(1) 0.68 (2) 0.74 noisani m-q (1)	
	(3) 0.50 (4) 1.00 (5)	
13.	Which of following reveal crystallographic structure of a solid?	181
	(1) α-rays (2) β rays	
	(3) γ rays (4) X rays	
14.	The 1st brillouin zone of simple cubic lattice is	
	(1) rhombic decahedron (2) truncated octahedron	.080
	(3) parallelopiped (4) cube	
15.	Bipolar logic families employ	
	(1) junction field effect transistor (2) p-n junctions	
	(3) n-p-n transistors (4) MOSFETs	
16.	A Schottky transistor when used as a switch switches between	21 Eg
	(1) cut-off and saturation regions	
	(2) cut-off and active regions	
	(3) active and saturation regions	
((4) different operating points in active region	

(3)

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Question No.	anone Questions				100 10 10 10 10 10 10 10 10 10 10 10 10	
17.	The most commonly used configuration of a transistor as a switch is					
	(1)	CB	(2)	CC		
	(3)	CE	(4)	CB or CC		
18.	Wh	ich of the following	g diodes is used	d for fastest switching	12. The a	
	(1)	p-n junction	(2)	Schottky		
	(3)	Vacuum	(4)	Zener	0 (0)	
19.	The	e time required to	go from ON to	OFF in a p-n junction	diode is equal	
	(1)	zero	(2)	switching time		
	(3)	transition time	(4)	storage time		
20.	In case of a MOSFET, the gate current					
	(1)	is negligibly smal	11			
2	(2) increases with increase in drain voltage					
	(3) decreases with decrease in drain voltage					
	(4)	is dependent on	drain current			
21.		he binding energy 6 MeV respectively		¹⁷ and He ⁴ nuclei are f the reaction	5.60 MeV and	
		$\text{Li}^7 + \text{p} \rightarrow 2\text{He}^4$	will be			
	(1)	19.6 MeV	(2)	2.4 MeV		
	(3)	$8.4\mathrm{MeV}$	(4)	17.28 MeV		
				Mar 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

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Question No.	Questions	Juestina		
22.	The count rate of a radioactive nuclei falls from 992 counts/minute 62 counts/minute in 10 hour. The half-life of the element is			
	(1) 1 hour (2) 2.5 hours			
	(3) 5 hours (4) 6 hours			
23.	The nucleus ²⁴² Pu ₉₄ decays to ²⁰⁶ Pb ₈₂ by emitting			
UP ZP	(1) 9α and 12β particles (2) 6α and 9β particles			
	(3) 9α and 6β particles (4) 6α and 12β particles			
24.	On an atomic scale, which of the following polarisation is importa	ant?		
	(1) electronic only (2) ionic only			
	(3) orientational only (4) both ionic and orientational	2 Fe (10)		
25.	At a frequency less than the plasma frequency, the collision loss	es cause		
	(1) total internal reflection			
	(2) wave attenuation			
	(3) partial reflection			
	(4) both attenuation and partial reflection			
26.	The minimum energy possessed by a particle confined to a one dime box of length L is	ensional		
	(1) 0 (2) $\frac{h^2}{(8\pi^2 m L^2)}$	arous B		
	(3) $\frac{\hbar^2}{(8\pi^2 \mathrm{m}\mathrm{L}^2)}$ (4) $\frac{\mathrm{mv}^2}{2\mathrm{L}}$			

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Question No.	Questions			
27.	The width of the spectral line resulting when an atom in an excited state of life time 10 ⁻⁸ sec. returns to the ground state is			
	(1) 0.33 m^{-1} (2) 0.33 cm^{-1}			
	(3) 33 m^{-1} (4) 33 cm^{-1}			
28.	The expected value of P for the wave function $\psi(x) = \sqrt{\frac{2}{L}} \sin \frac{\pi x}{L}$; $0 < x < L$			
	is solution and (a) relation a bar of the second			
19 7	(1) 0 (2) $\frac{1}{2}$			
	(3) 1 (4) infinity (4)			
29.	The particles described by anti symmetric wavefunctions obey			
204027	(1) Maxwell Boltzmann Statistics (2) Bose-Einstein Statistics			
	(3) Fermi-Dirac Statistics (4) All the three before			
30.	Born approximation can be used			
	(1) only within very low energy limits			
	(2) only within high energy limits			
fractions	(3) in both very low as well as high energy limits			
	(4) none of the three before			
31.	If a charged particle moving in a uniform magnetic field looses 4% of its kinetic energy, radius of curvature of its path changes by			
	(1) 2% (2) 4%			
	(3) 10% (4) 7.5%			

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Question No.	Questions Questions			
32.	A length ℓ of a wire is bent to form a circular coil of some turns. A current I is passed through it and it is placed in a magnetic field B. The maximum torque acting on the coil is			
	(1) $1 B \ell^2$ (2) $4 \pi I B \ell^2$			
	(3) $I \ell^2 B/4\pi$ (4) zero			
33.	An atom is paramagnetic if it has			
	(1) an electric dipole moment (2) no magnetic moment			
	(3) a magnetic moment (4) no electric dipole moment			
34.	The couple acting on a magnet of length 10 cm and pole strength 15 An kept in a filed $B = 2 \times 10^{-5}$ T at an angle of 30° is			
	(1) $1.5 \times 10^{-5} \text{ Nm}$ (2) $1.5 \times 10^{-3} \text{ Nm}$			
	(3) $1.5 \times 10^{-2} \text{ Nm}$ (4) $1.5 \times 10^{-6} \text{ Nm}$			
35.	A fan blade of length $\sqrt[]{\pi}$ meter rotates with a frequency 5 cycles/se			
146	perpendicular to a magnetic field 10 tesla. The potential difference between the centre and end of the blade is			
e image	(1) -50 V (2) $+50 \text{ V}$			
16	(3) -2.0 V (4) $+0.02 \text{ V}$			
36.	The self inductance of an air core solenoid of 80 cm length and 500 turns each of circular cross-section with 2 cm diameter is			
	(1) 150.6 μH (2) 162.2 μH			

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Question No.	Questions Questions
37.	An a.c. source $V = 100 \sin 100 \pi t$ is connected to a resistor of 20 Ω . The rms value of current through the resistor is
	(1) 10 A (2) $\frac{10}{\sqrt{2}} \text{ A}$
	(3) $\frac{5}{\sqrt{2}}$ A (4) $\frac{7}{\sqrt{2}}$ A
38.	A voltage signal is represented as $V = 220\sqrt{2} \cos{(50\pi)} t$. How many times will the current be zero in one-second
	(1) 50 (2) 100 (2) 100 (3)
	(3) 33
39.	The reactance of a capacitor (10 pF) connected across a d.c. source is (1) zero (2) infinity (3) $10^4 \Omega$ (4) $10^7 \Omega$
	The electric field 'E' and the magnetic field 'B' in an electromagnetic wave (1) parallel to each other (2) inclined at an angle of 45° (3) perpendicular to each other (4) opposite to each other
41.	The shortest height of a vertical mirror required to see the entire image of a man, will be
	1) $\frac{1}{3}$ of man's height (2) $\frac{1}{2}$ of man's height
(6	3) $\frac{2}{3}$ of man's height (4) equal to man's height

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Department of Physics

Question No.	n Questions			
42.	If 'C' is the velocity of light in vacuum, then the time taken by the light to travel through a glass plate of thicknesss 't' and refractive index ' μ ' is			
81	(1) $t/\mu C$	(2) tμC		
0.61 pt.	(3) µt/C	(4) ${}^{tC}\!\!\!/_{\mu}$		
43.	A thin prism of angle 6° made of glass of refractive index 1.5 is combined with another prism of glass with $\mu = 1.75$ so as to produce dispers without deviation. The angle of second prism is			
Haaraa	(1) 7°	(2) 4.67°		
io zebn	(3) 9°	(2) 4.67° (4) 5°		
44.	A simple microscope consists of a concave lens of power -10 D and a convex lens of power $+20$ D in contact. If the image formed is at infinity, then the magnifying power (D = 25 cm) is			
	(1) 2.5	(2) 3.5		
enoisi	(3) 2.0	(4) 3.0	60. Researd	
45.	A symmetric double convex lens is cut in two equal parts along its diameter. If the power of original lens was 4D, the power of divided lens will be			
	(1) 2 D	(2) 3 D		
eacres to	(3) 4 D	(4) 5 D		
46.	If the resolution limit of the eye is 1 minute and at a distance x km from the eye, two persons stand with a lateral seperation of 3 meters, then value of x for which the two persons can be resolved by naked eye is			
	(1) 10 km	(2) 15 km		
	(3) 20 km	(4) 30 km		

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Question No.	Another Questions Indiana					
47.	If the Young's double slite experiment is performed in water, then					
Marita Marita	(1) the fringe width decreases (2) the fringe width increases					
	(3) the fringe width does not change (4) there will be no fringes					
48.	If n coherent sources of intensity I_0 are super imposed at a point, the intensity of the point is					
benida	(1) $n I_0$ (2) $n^2 I_0$					
densand	(3) $n^3 I_0$ (4) I_0 / n					
49.	In Fresel's biprism experiment, the distance between biprism and screen is 4 m. The angle of the prism is 2×10^{-3} radian and the refractive index of glass of the biprism is 1.5. The fringe width observed on the screen is 15×10^{-4} m. The number of fringes on the screen is					
Official	(1) 3 (2) 2					
	(3) 6 (4) 8					
50.	If σ is surface charge density and \in is electric permittivity, the dimensions of σ_{\in} are same as					
011	(1) electric force (2) electric field intensity					
	(3) pressure (4) charge					
51.	The spring constant k of a wire of length L, having an area of cross-section A, Young's modulous Y behaving as a spring is					
nod? is	$(1) \frac{YA}{L} \qquad \qquad (2) \frac{YA}{2L} \qquad .$					
	(3) $\frac{2YA}{L}$ (4) $\frac{YL}{A}$					

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Department of Physics M.D. University, Rohtal

No.	Questions
52.	The dimensions of Poisson's ratio are
	(1) $[M^{\circ} L^{\circ} T^{\circ}]$ (2) $[M L^{-1} T^{-2}]$
	(3) $[M L^2 T^{-4}]$ (4) $[M L^2 T^{-3}]$
53.	The temperature at which the phase transition occurs depends upon
	(1) pressure (2) volume
	(3) density (4) mass
54.	The temperature of H ₂ at which the rms velocity of its molecules is seve times the rms velocity of the nitrogen molecules at 300 k is
66 a	(1) 2100 k (2) 1700 k
	(3) 1350 k (4) 1050 k
	How many cylinders of hydrogen at atmospheric pressure are required to fill a balloon of volume 500 m ³ if the hydrogen
	0.05 m^3 at an absolute pressure of $15 \times 10^5 \text{ Pa}$?
	0.05 m ³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675
66.	0.05 m ³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675
66.	0.05 m³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675 (3) 605 (4) 710 If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is
66.]	0.05 m³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675 (3) 605 (4) 710 If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is
66.] (()	0.05 m³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675 (3) 605 (4) 710 If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is (1) 70.0 J (2) 68.2 J
7. C	0.05 m³ at an absolute pressure of 15 × 10 ⁵ Pa? (1) 700 (2) 675 (3) 605 (4) 710 If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is (1) 70.0 J (2) 68.2 J (3) 74.8 J (4) 78.2 J One mole of a gas isobarically heated by 40 k received.

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Department of Physics M.D. University, Rohlak

Question No.	QUESTIONS				
58.	A carnot engine first operates between 200°C and 0°C and then between				
	0°C and 200°C. The ratio of efficiencies (η_2/η_1) in two cases is				
	(1) 1:15	(2) 1:1			
48,000	(3) 1:2	(4) 1.73:1			
59.	The propagation of hear	t in air takes place by	10		
	(1) conduction	(2) convection			
(toves at	(3) radiation	(4) all the three before			
60.	The ratio of rate of radiation of energy by two spheres of same material having radii r and 4r and temperature $2T_0$ and T_0 respectively is				
	(1) 1:1	(2) 1:2			
in ed to	(3) 2:1	(4) 3:1			
61.	A small element ℓ is cut from a circular ring of radius 'a' and λ charge per unit length. The net electric field at the centre of the ring will be				
	(1) zero	$(2) \frac{\lambda \ell}{4\pi \epsilon_0} a^2$			
rds deta	(3) ∞	$(4) \frac{\lambda}{4} \in \pi \ell$			
62.	horizontal in a region	with a velocity of 10 ⁷ m/s at an ang of uniform electric field of 5000 distance covered in vertical direction	N/C vertically		
	(1) 14.2 mm	(2) 15 mm			
	(3) 12.6 mm	(4) 14.2 cm			

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Head Department of Physics M.D. University, Rohtel

Question No.	Wilestions				iveHsapt oVI
63.	A surface $S = 10\hat{j}$ is kept in an electric field $E = 2\hat{i} + 4\hat{j} + 7\hat{k}$. The electric flux through the surface will be				
	(1)	40 units	(2)	50 units	
	(3)	30 units	(4)	20 units	
64.	Two	o drops of water each V form a single d	ch with a charg rop. The surfac	e of 3 × 10 ⁻⁹ C having s ce potential of the nev	urface potentia w drop is
	(1)	794 V	(2)	1000 V	
	(3)	250 V	(4)	750 V	
65.	The electric field intensity at a point at a distance 20 cm on a line making an angle 45° with the axis of a dipole of moment 10 C – m is				
ted to a	(1)	$1.77 \times 10^{13} \text{ V/m}$	(2)	$0.177 \times 10^{13} \text{V/m}$	
Lio	(3)	$17.7 \times 10^{13} \text{ V/m}$	(4)	$177 \times 10^{13} \text{V/m}$	
66.	Two capacitors A and B having capacitance 10 μF and 20 μF respectively are connected in series with a 12 V battery. The ratio of charges on A and B is				
	(1)	0.5:1	(2)	1:1	
	(3)	2:1	(4)	1:1.5	
67.	The force acting upon a charged particle kept between the plates of a charged capacitor is F. If one of the plates of the capacitor is removed, force acting on the same particle will be				
	(1)	0	(2)	F/2	9 (I) P
	(3)	F	(4)	2 F	
G-EE-2	2015	(Physics)-Code-	-B (13)	Awan	hu

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Question No.	annitant Questions	Question			
68.	A 5°C rise in temperature is observed in a conductor when current is passed through it. If the current is doubled, the rise in temperature will be approximately				
	(1) 20°C (2) 16°C				
	(3) 12°C (4) 10°C (8)				
69.	A current 0.5 A flows through a resistance 2 Ω connected acrows The current changes to 0.25 A as resistance is increased to 5 Ω of the cell is	oss a cell. The emi			
	(1) 1 V (2) 1.5 V				
66.	(3) 2 V (4) 2.5 V				
70.	Two heater coils of same material are connected in parallel a mains and the length and diameter of one coil is double that of t Which one will produce more heat (1) thinner coil (2) thicker (3) both will produce same amount of heat (4) can't pr	he other.			
71.	The average power per unit area at a distance of 2 m from a small bulb emitting 20 W of EM radiations uniformally in all directions is				
	(1) 0.69 W/m^2 (2) 0.56 W/m^2				
	(3) 0.78 W/m^2 (4) 0.39 W/m^2				
72.	The ratio of wavelengths associated with a proton and an alpha particle accelerated through same potential is				
	(1) 2 (2) $\sqrt{2}$				
	(1) 2 (2) $\sqrt{2}$ (3) 4 (4) $\frac{1}{2}\sqrt{2}$				
G-EE-2	2015 (Physics)-Code-B (14)	L			

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Question No.	Questions The momentum of a photon with energy equal to rest energy of an is			noliterally	
73.				n electron	
	(1) zero	(2)	$2.73 \times 10^{-2} \ \mathrm{kg \ ms^{-1}}$		
	(3) $1.99 \times 10^{-24} \text{ kg ms}^{-1}$	(4)	infinite		
74.	The graph between freque is	ency of inci	dent light and the stopping	potential	
	(1) parabola	(2)	straight line		
85.	(3) hyperbola	(4)	circle		
75.	A ruby laser produces rad If the energy/pulse is 0.39	iations of J, the nu	662.6 nm pulses of duration nbr of photons produced are	10 ⁻⁹ sec.	
	(1) 1.3×10^9	(2)	1.3×10^{18}		
86, 1	(3) 1.3×10^{27}	(4)	3.9×10^{18}		
76.	At its closest approach, the distance between Mars and the Earth is 60 million km. How long will it take to send a radio message from a space probe of Mars to Earth in this situation?				
	(1) 5 sec	(2)	200 sec		
	(3) 0.2 sec	(4)	500 sec		
77.	How many different wavelengths may be observed in the spectru hydrogen sample if the atoms are excited to third excited state			m from a	
	(1) 3	(2)	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		
	(3) 5	(4)	6 wentled tealier (t)		
78.	For a single ionised helium will absorb	atom, the	e longest wavelength in grou	ınd state	
	(1) 912 A°	(2)	304 A°		
	(3) 606 A°	(4)	1216 A°		
	Compositivation 2		(d) the potential energy.		

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Question No.	Questions
79.	z component of an orbital angular momentum is $\frac{h}{\pi}$, its magnetic quantum number is (1) 1 (2) 2 (3) -1 (4) 0
80.	If the uncertainity in the position of a particle is equal to its de-Broglie wavelength, the minimum uncertainity in the velocity would be
SHE FO.	(1) $\frac{1}{4\pi}$ (2) $\frac{v}{4\pi}$ Residue to the first of $\frac{mv}{4\pi}$ and $\frac{mv}{4\pi}$ residue to the first of $\frac{mv}{4\pi}$ residue to $\frac{mv}{4\pi}$
81.	For a conservative system, generalized force (1) has necessarily the dimensions of force
er dink nokta n	 (2) is a dimensionless quantity (3) can not have dimensions of force (4) may have dimensions of torque
82.	Mutual interaction forces between two particles can change (1) the linear momentum but not the kinetic energy (2) the kinetic energy but not the linear momentum (3) the linear momentum as well as kinetic energy (4) neither the linear momentum nor the kinetic energy
83.	If the Lagrangian does not depend on time explicitly (1) the Hamiltonian is constant (2) the Hamiltonian can not be constant (3) the kinetic energy is constant (4) the potential energy is constant

Department of Physics

Question No.	englis Questions and
84.	The ecentricity (e) of the orbit of a satellite having maximum and minimum velocities as \mathbf{v}_1 and \mathbf{v}_2 is
	$(1) \frac{\mathbf{v_1}}{\mathbf{v_2}} \qquad (2) \frac{\mathbf{v_2}}{\mathbf{v_1}} \qquad (3)$
e de la composição de l	(3) $\frac{\mathbf{v}_1 - \mathbf{v}_2}{\mathbf{v}_1 + \mathbf{v}_2}$ (4) $\frac{\mathbf{v}_1 + \mathbf{v}_2}{\mathbf{v}_1 - \mathbf{v}_2}$
85.	For a one dimensional oscillator, the representative point in two dimensional phase space traces
	(1) an ellipse " (2) a parabola
	(3) a hyperbola (4) always a straight line
86.	For a particle at rest in a rotating frame, the pseudo force acting on it in is
	(1) zero (2) only centrifugal force
	(3) only coriolis force (4) both centrifugal and coriolis force
87.	If constraint forces do work and total mechanical energy is not conserved then constraints are named as
	(1) bilateral constraint (2) unilateral constraint
	(3) dissipative constraint (4) regenerative constraint
88.	A force $\vec{F} = -\vec{\nabla} u$ is said to be conservative if
	(1) grade F is zero (2) div F is zero
	(3) Curl F is zero (4) none of three before
89.	Which of the following is not an explicit function of time
	(1) velocity (2) momentum
	(3) acceleration (4) potential energy

Department of Physics M.D. University, Rohtak

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Question No.	Questions				
90.	If external torque on a system is zero, then its angular velocity (1) remains unchanged only if moment of inertia changes (2) changes only if moment of inertia remains unchanged (3) remains unchanged only if moment of inertia remains fixed (4) none of the three before				
91.	When only s-wave scattering takes place, then the ratio of total scattering quantum-mechanically to the cross-section classically for the same radius is (1) 2 (2) 4 (3) $\frac{1}{2}$ (4) $\frac{1}{4}$				
92.	The Stern-Gerlach experiment proves the existance of (1) electronic charge (2) electronic depole moment (3) electronic spin (4) electron mass				
93.	For the wavefunction $\psi_n = A \sin \frac{n \pi x}{a}$ confined to $0 < x < a$, the value of normalization constant is (1) $\sqrt{\frac{2}{a}}$ (2) $\sqrt{\frac{a}{2}}$ (3) $\frac{2}{a}$ (4) $\frac{a}{2}$				
94.	Entropy of the universe tends to be (1) minimum (2) zero (3) constant (4) increasing always				

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Question No.	Questions						
95.	The internal energy of an isolated system						
	(1) remains constant (2) is zero						
	(3) infinite (4) none of the three before						
96.	The number of degrees of freedom of a gas is F, then the value of γ is						
	(1) $1 + \frac{2}{F}$ (2) $\frac{2}{F}$						
	(3) $\frac{F}{2} + 1$ (4) zero						
97.	The work done when a gram-molecule of a gas expends isothermally at 27° C to double it original volume is $[R = 8.3 \text{ J k}^{-1} \text{ mole}^{-1}]$						
	(1) 725.8 Joule (2) 1725.8 Joule						
	(3) -725.8 Joule (4) zero						
98.	In quantum statistics, the value of occupation index is						
	(1) equal to 1 (2) equal to or greater than 1						
	(3) equal to or less than 1 (4) less than 1						
99.	The specific heat of saturated steam is always						
	(1) positive (2) zero						
	(3) negative (4) infinite						
100.	The unit of entropy is						
	(1) Jk . (2) Jk ⁻¹						
	(3) J (4) N m ⁻² Hoan M						

(Total No. of printed pages: 20)

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

10235

(PG-EE-2015)

Subject : PHYSICS

Code



Time: 11/4 Hours

Sr. No.

Max. Marks: 100

Total Questions: 100

Mother's Name _____ Date of Examination____

(Signature of the candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. All questions are compulsory.

- 2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
- 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
- 4. The candidate **MUST NOT** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 6. Use only Black or Blue BALL POINT PEN of good quality in the OMR Answer-Sheet.
- 7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE hysics BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL, Rohtak NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

Question No.	800 B	stions					
1. (1. (1. (1. (1. (1. (1. (1. (1. (1. (1.	A small element ℓ is cut from a circular ring of radius 'a' and λ charge per unit length. The net electric field at the centre of the ring will be						
	(1) zero		$\frac{\lambda \ell}{4\pi \epsilon_0} a^2$				
	(3) ∞	(4)	$\frac{\lambda}{4} \in \pi \ell \tag{8}$				
2.	horizontal in a region of a	uniform	ity of 10 ⁷ m/s at an angle 30° with the electric field of 5000 N/C vertically vered in vertical direction above initial				
	(1) 14.2 mm	(2)	15 mm				
	(3) 12.6 mm	(4)	14.2 cm				
3.	A surface $S = 10\hat{j}$ is kept in an electric field $E = 2\hat{i} + 4\hat{j} + 7\hat{k}$. The electric flux through the surface will be						
	(1) 40 units	(2)	50 units				
	(3) 30 units	(4)	20 units				
4.	Two drops of water each with 500 V form a single drop. The	n a charge he surfac	e of 3 × 10 ⁻⁹ C having surface potential ee potential of the new drop is				
	(1) 794 V	(2)	1000 V				
	(3) 250 V	(4)	750 V				
5.	The electric field intensity a an angle 45° with the axis of	t a point f a dipole	at a distance 20 cm on a line making				
	(1) $1.77 \times 10^{13} \text{ V/m}$	(2)	$0.177 \times 10^{13} \text{V/m}$				
	(3) $17.7 \times 10^{13} \text{ V/m}$	(4)	$177 \times 10^{13} \text{V/m}$				
	mad with the same of the same		The man				

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No.					Que	stions			ateria.
6.	Two capacitors A and B having capacitance 10 μ F and 20 μ F respectively are connected in series with a 12 V battery. The ratio of charges on A and B is								
	(1)	0.5:	1		(2)	1:1			
	(3)	2:1			(4)	1:1.5			
.7. th the licely said and the	cha	rged c	apacito	g upon a chor is F. If o	ne of th rticle wi	e plates o	of the ca	pacitor	is remove
	(1)	0				F/2			
	(3)	F			(4)	2 F			
8.	A 5°	°C rise	e in te	mperature	is obser	ved in a	conducto	r when	current
electric	pass	sed thi	rough i imately	t. If the cui	rrent is	doubled, t	he rise i	n tempe	erature wi
electric	pass	sed thi	rough i imately	t. If the cur	rrent is d	doubled, t		n tempe	erature w
lectric	be a	sed thi pproxi	rough i imately	7	rrent is (doubled, t	h the su ts		erature w
9. dept.	pass be a (1) (3) A cu	20°C 12°C	0.5 A	stma 0ā	(2) (4)	16°C 10°C	O conne	ected ac	erature w
9. men	pass be a (1) (3) A cu	20°C 12°C rrent curren	0.5 A	flows throu	(2) (4)	16°C 10°C	O conne	ected ac	erature w
9.dres	(1) (3) A cu The of th	20°C 12°C rrent current e cell	0.5 A	flows throu	(2) (4) gh a res	16°C 10°C sistance 2	O conne	ected ac	erature with ross a cel Ω. The en
	(1) (3) A cut The of the (1) (3) Two main	20°C 12°C 12°C 12°C 12°C 12°C 12°C 12°C 12	0.5 A ant char is	flows throu	(2) (4) (3) (4) (4) (4) (4) (4) (4) (4) (4)	16°C 10°C sistance 2 sistance is 1.5 V 2.5 V are conne	Ω connes increas	ected aced to 5	ross a cel Ω. The en
9	(1) (3) A cu The of th (1) (3) Two main Which	20°C 12°C 12°C 12°C 12°C 12°C 12°C 12°C 12	0.5 A at char is r coils the leavill pr	flows throunges to 0.25 of same magth and di	(2) (4) (3) (4) (4) (4) (4) (4) (4) (4) (4)	16°C 10°C sistance 2 sistance is 1.5 V 2.5 V are conne	Ω connes increas	ected aced to 5	erature with the other

M.D. University, Robtak

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Question No.	Questions	Inoitas VO				
11.	The spring constant k of a wire of length L, having an area of cross section A, Young's modulous Y behaving as a spring is					
	$(1) \frac{YA}{L} \qquad (2) \frac{YA}{2L}$					
neewà	$(3) \frac{2YA}{L} \qquad (4) \frac{YL}{A}$					
12.	The dimensions of Poisson's ratio are					
	(1) $[M^{\circ} L^{\circ} T^{\circ}]$ (2) $[M L^{-1} T^{-2}]$					
	(3) $[M L^2 T^{-4}]$ (4) $[M L^2 T^{-3}]$					
13.	The temperature at which the phase transition occurs depend	s linon				
	(1) pressure (2) volume					
	(3) density (4) mass					
14.	The temperature of H ₂ at which the rms velocity of its molecul times the rms velocity of the nitrogen molecules at 300 k is (1) 2100 k (2) 1700 k					
	(1) 1000 K					
15.	How many cylinders of hydrogen at atmospheric pressure are a fill a balloon of volume 500 m ³ , if the hydrogen is stored in control of the c	equired to vlinders of				
	(1) 700 (2) 675					
86	(3) 605 (4) 710					
16.	If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is					
w	(1) 70.0 J (2) 68.2 J					
	(3) 74.8 J (4) 78.2 J	A				

Department of Physic M.D. University, Robtak (3)

Question No.	Questions	destion No.				
17.	One mole of a gas isobarically heated by 40 k receives heat 1.162 kJ. The ratio of specific heats of the gas is					
	(1) 1.7 (2) 1.4					
	(3) 1.3 (4) 1.5					
18.	A carnot engine first operates between 200°C and 0°C and the	nen between				
	0°C and 200°C. The ratio of efficiencies (η_2/η_1) in two cases is	8				
	(1) 1:15 (2) 1:1					
	(3) 1:2 (4) 1.73:1					
19.	The propagation of heat in air takes place by					
	(1) conduction (2) convection					
	(3) radiation (4) all the three before					
20.	The ratio of rate of radiation of energy by two spheres of san having radii r and 4r and temperature 2T ₀ and T ₀ respectively					
	(1) 1:1					
of box	(3) 2:1					
21.	For a conservative system, generalized force					
	(1) has necessarily the dimensions of force					
	(2) is a dimensionless quantity	e e pas				
9/11/65	(3) can not have dimensions of force					
	(4) may have dimensions of torque	Snow				
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Department of Physics M.D. University, Rohtak (4)

Question No.	Questions	,024 NO.
22.	Mutual interaction forces between two particles can change	.00
	(1) the linear momentum but not the kinetic energy	
	(2) the kinetic energy but not the linear momentum	
	(3) the linear momentum as well as kinetic energy	
	(4) neither the linear momentum nor the kinetic energy	
23.	If the Lagrangian does not depend on time explicitly	
	(1) the Hamiltonian is constant	
	(2) the Hamiltonian can not be constant	
100	(3) the kinetic energy is constant	
	(4) the potential energy is constant	
24.	The ecentricity (e) of the orbit of a satellite having maximum and mi velocities as v_1 and v_2 is (1) $\frac{v_1}{v_2}$ (2) $\frac{v_2}{v_1}$	nimun
	(3) $\frac{v_1 - v_2}{v_1 + v_2}$ (4) $\frac{v_1 + v_2}{v_1 - v_2}$	
25.	For a one dimensional oscillator, the representative point dimensional phase space traces	in two
	(1) an ellipse (2) a parabola	
304	(3) a hyperbola (4) always a straight line	
26.	For a particle at rest in a rotating frame, the pseudo force acting of is	on it ir
	(1) zero (2) only centrifugal force	
بارت د	(3) only coriolis force (4) both centrifugal and coriolis	force

Department of Physics M.D. University, Robtak (5)

	If constraint forces do work and total mechanical energy is not conserved then constraints are named as (1) bilateral constraint (2) unilateral constraint (3) dissipative constraint (4) regenerative constraint
	(3) dissipative constraint (4) regenerative constraint
	(3) the lanear momentum as well as kinetic energy
	A force E Vy is said to be seen the is
	A force $\vec{F} = -\vec{\nabla} u$ is said to be conservative if
	(1) grade F is zero (2) div F is zero
	(3) Curl F is zero (4) none of three before
29.	Which of the following is not an explicit function of time
	(1) velocity (2) momentum
	(3) acceleration (4) potential energy
30.	If external torque on a system is zero, then its angular velocity
	(1) remains unchanged only if moment of inertia changes
	(2) changes only if moment of inertia remains unchanged
20.	(3) remains unchanged only if moment of inertia remains fixed
	(4) none of the three before
	As the interatomic distance in a solid increases, the width of an allowed energy band
	(1) increases (2) decreases
	(3) is unchanged (4) first increases then decreases
32.	The atomic packing factor for a bcc metal structure is
	(1) 0.68 (2) 0.74
sorot edi	(3) 0.50 (4) 1.00 Dem Evan

Head Department of Physics M.D. University, Rohtak

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Question No.	enoties Questions	Quescien No.				
33.	Which of following reveal crystallographic structure of a solid?					
	(1) α-rays (2) β rays					
	(3) γ rays (4) X rays					
34.	The 1st brillouin zone of simple cubic lattice is					
	(1) rhombic decahedron (2) truncated octahedron					
	(3) parallelopiped (4) cube					
35.	Bipolar logic families employ					
10	(1) junction field effect transistor (2) p-n junctions					
Herek Hari	(3) n-p-n transistors (4) MOSFETs	Augus				
36.	A Schottky transistor when used as a switch switches between					
	(1) cut-off and saturation regions					
	(2) cut-off and active regions					
la (fraq	(3) active and saturation regions					
	(4) different operating points in active region					
37.	The most commonly used configuration of a transistor as a switch	h is				
	(1) CB (2) CC					
electron	(3) CE (4) CB or CC					
38.	Which of the following diodes is used for fastest switching	•				
	(1) p-n junction (2) Schottky					
war	(3) Vacuum (4) Zener	Pro				

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Questio No.	Questions notices
39.	The time required to go from ON to OFF in a p-n junction diode is equate
	(1) zero (2) switching time (3) transition time
40.	(4) storage time
40.	In case of a MOSFET, the gate current
	(1) is negligibly small
	(2) increases with increase in drain voltage
	(3) decreases with decrease in drain voltage
	(4) is dependent on drain current
41.	The average power per unit area at a distance of 2 m from a small bulb emitting 20 W of EM radiations uniformally in all directions is
	(1) 0.69 W/m^2 (2) 0.56 W/m^2
	(3) 0.78 W/m^2 (4) 0.39 W/m^2
42.	The ratio of wavelengths associated with a proton and an alpha particle accelerated through same potential is
	(1) 2 (2) $\sqrt{2}$
81.01	(3) 4 (4) $\frac{1}{2\sqrt{2}}$
43.	The momentum of a photon with energy equal to rest energy of an electron is
	(1) zero (2) $2.73 \times 10^{-2} \text{ kg ms}^{-1}$
	(3) $1.99 \times 10^{-24} \text{ kg ms}^{-1}$ (4) infinite
u S	Amour there.

Department of Physics M.D. University, Rohtak

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Question No.	Questions The graph between frequency of incident light and the stopping potential is				
44.					
	(1) parabola	(2)	straight line		
	(3) hyperbola	(4)	circle		
45.	A ruby laser produces radiation If the energy/pulse is 0.39 J, t		662.6 nm pulses of duration 10 ⁻⁹ sec mbr of photons produced are		
	(1) 1.3×10^9	(2)	1.3×10^{18}		
	(3) 1.3×10^{27}	(4)	3.9×10^{18}		
46.		t take	nce between Mars and the Earth is to send a radio message from a space tion?		
Suntain a	(1) 5 sec	(2)			
	(3) 0.2 sec	(4)	500 sec		
47.	7. How many different wavelengths may be observed in the shydrogen sample if the atoms are excited to third excited				
	(1) 3	(2)	4		
a idəli s	(3) 5	(4)	62. If C is the velocity of he 6		
48.	For a single ionised helium atom, the longest wavelength in gr will absorb				
58:	will absorb				
58.	will absorb (1) 912 A°	(2)	304 A°		
58.		(2) (4)	304 A° 1216 A°		

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Question No.	Questions moltan			
53.	A thin prism of angle 6° made of glass of refractive index 1.5 is combined with another prism of glass with $\mu = 1.75$ so as to produce dispersion without deviation. The angle of second prism is			
	(1) 7° (2) 4.67°			
off.	(3) 9° (4) 5°			
54.	A simple microscope consists of a concave lens of power -10 D and a convex lens of power $+20$ D in contact. If the image formed is at infinity, then the magnifying power (D = 25 cm) is			
Et Oreitre de	(1) 2.5 (2) 3.5			
	(3) 2.0 (4) 3.0			
55.	A symmetric double convex lens is cut in two equal parts along its diameter. If the power of original lens was 4D, the power of divided lens will be			
	(1) 2 D (2) 3 D			
ona Veh	(3) 4 D (4) 5 D and a diameter (4)			
56.	If the resolution limit of the eye is 1 minute and at a distance x km from the eye, two persons stand with a lateral seperation of 3 meters, then value of x for which the two persons can be resolved by naked eye is			
	(1) 10 km (2) 15 km			
	(3) 20 km (4) 30 km			
57.	If the Young's double slite experiment is performed in water, then			
	(1) the fringe width decreases (2) the fringe width increases			
	(3) the fringe width does not change (4) there will be no fringes			
58.	If n coherent sources of intensity I_0 are super imposed at a point, the intensity of the point is			
	(1) $n I_0$ (2) $n^2 I_0$			
	(3) $n^3 I_0$ (4) I_0/n Ahwein from			

Head Department of Fl. a M.D. University, Ront. (11)

Question No.	Questions				
59.	In Fresel's biprism experiment, the distance between biprism and screen is 4 m. The angle of the prism is 2×10^{-3} radian and the refractive index of glass of the biprism is 1.5. The fringe width observed on the screen is 15×10^{-4} m. The number of fringes on the screen is				
	(1) 3	(2)			
has C. Mani	(3) 6	(4)	8		
60.	If σ is surface charge density and ϵ is electric permittivity, the dime				
	of $\sigma = \sigma$ are same as				
redammil	(1) electric force	(2)	electric field intensity		
od II.	(3) pressure	(4)	charge		
61.	If the binding energy/nucleon in Li ⁷ and He ⁴ nuclei are 5.60 MeV ar 7.06 MeV respectively, the energy of the reaction				
edi as rs, the	$Li^7 + p \rightarrow 2He^4$ will be		A) To theid not interest to the control of the cont		
RI 51	(1) 19.6 MeV	(2)	2.4 MeV		
	(3) 8.4 MeV	(4)	17.28 MeV		
62.	The count rate of a radioact 62 counts/minute in 10 hour.		clei falls from 992 counts/minute to alf-life of the element is		
3.05	(1) 1 hour	(2)	2.5 hours		
di jak	(3) 5 hours	(4)	6 hours of the sentence of the		
63.	The nucleus ²⁴² Pu ₉₄ decays to ²⁰⁶ Pb ₈₂ by emitting				
	(1) 9 α and 12 β particles	(2)	6 α and 9 β particles		
NON	(3) 9 α and 6 β particles	(4)	6 α and 12 β particles		

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electronic only orientational only (2) frequency less than the plasma total internal reflection wave attenuation partial reflection both attenuation and partial ref minimum energy possessed by a pof length L is	both ionic and orientational frequency, the collision losses cause	
a frequency less than the plasma total internal reflection wave attenuation partial reflection both attenuation and partial ref minimum energy possessed by a pof length L is	frequency, the collision losses cause flection particle confined to a one dimensional	
of length L is	71. When only sewave soutterib;	
0 (2)	$\frac{h^2}{(8\pi^2 \text{ m L}^2)}$ $\frac{\text{mv}^2}{2\text{ L}}$	
The width of the spectral line resulting when an atom in an excited star of life time 10 ⁻⁸ sec. returns to the ground state is		
$0.33 \mathrm{m}^{-1}$ (2)	0.33 cm ⁻¹ (8)	
33 m ⁻¹ (4)	33 cm ⁻¹	
expected value of P for the wave	function $\psi(x) = \sqrt{\frac{2}{L}} \sin \frac{\pi x}{L}$; $0 < x < L$ $\frac{1/2}{2}$ infinity Awar Green	
	A SIS - CODINGED TO A SERV	

Head Department of Physics M.D. University, Rohtak (13)

Question No.	Questions				
74.	Entropy of the universe tends to be				
	(1) minimum	(2)	zero * # 16 (1)		
	(3) constant	(4)	increasing always		
75.	The internal energy of an isolated system				
	(1) remains constant	(2)	is zero		
	(3) infinite	(4)	none of the three before		
76.	The number of degrees of free	f a gas is F, then the value of γ is			
	$(1) 1 + \frac{2}{F}$				
	F Company of the Comp		zero w bana etamilizado (b)		
77.	The work done when a gram- 27°C to double it original volu		ule of a gas expends isothermally at $[R = 8.3 \text{ J k}^{-1} \text{ mole}^{-1}]$		
	(1) 725.8 Joule	(2)	1725.8 Joule		
	(3) -725.8 Joule	(4)	zero		
78.	In quantum statistics, the val	ue of o	ccupation index is		
Malle, If	(1) equal to 1	(2)	equal to or greater than 1		
89.	(3) equal to or less than 1	(4)	less than 1		
79.	The specific heat of saturated	steam	is always		
2.1	(1) positive	(2)	zero		
	(3) negative	(4)	infinite from		

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Question No.	Questions				
80.	The unit of entropy is				
	(1) $J k$ (2) $J k^{-1}$				
	(3) J (4) N m ⁻²				
81.	A pair is constrained to move along the inner surface of a hemisphere, then the number of degrees of freedom of the particle is				
	(1) one (2) two				
	(3) four (4) three				
82.	For a conservative system, the potential energy is				
	(1) coordinate and velocity dependent				
	(2) coordinate dependent and velocity independent				
	(3) coordinate independent and velocity dependent				
	(4) coordinate and velocity independent				
83.	The distance time graph of a particle at time t makes an angle 45° with respect to time axis. After one second, it makes angle 60° w.r.t. to time axis, what is the acceleration of the particle				
	(1) $\sqrt{3} - 1 \text{ unit}$ (2) $\sqrt{3} + 1 \text{ unit}$				
	(3) $\sqrt{3}$ unit (4) 1 unit				
84.	A ball kept in a box (closed), moves in the box colliding with the walls. If the box is kept on a smooth surface, the centre of mass of the				
	(1) box remains constant				
	(2) box and the ball system remains constant				
	(3) ball remains constant (4) ball relative to the box remains constant				
	(4) ball relative to the box remains constant				

Question No.	Questions				
85.	Centre of mass of a semicircular plate of radius R, the density of which linearly varies with distance being d at the centre to 2d at the circumference is				
	(1) ${}^{3}R/_{\pi}$ from the centre (2) ${}^{4}R/_{3\pi}$ from the centre				
1811 N.	(3) $\frac{5R}{\pi}$ from the centre (4) $\frac{7R}{5\pi}$ from the centre				
86.	A uniform rod is placed vertically on a smooth surface and then released. Then				
	(1) the centre of rod follows a straight line path				
COVER DE	(2) the centre of mass follows circular path				
	(3) the instantaneous axis is passing through the point of contact				
	(4) all the three before				
87.	In case of a radioactive decay, if the parent nucleus is initially at rest, then after decay, the centre of mass will				
	(1) move on a straight line (2) move in a circle				
	(3) remain at rest (4) follow a parabolic path				
88.	Two pendulums of length ℓ_1 and ℓ_2 start vibrating. If at some instant, the two are in mean position in the same phase, then after how many vibrations of the shorter pendulum, the two will be in phase in the mean position $[\ell_1, > \ell_2; \ell_1 = 121 \text{ cm. } \ell_2 = 100 \text{ cm.}]$				
	(1) 11 (2) 10 m/4 01 × 6.1 (1)				
	(3) 9 MANAGE (4) 8 MANAGE (6)				
89.	A solid copper sphere suspended from a massless spring has a time period of 4 second. The sphere is completely immersed in a liquid having density 0.125 times that the brass. If the sphere remains in the liquid during oscillations, the time period will be				
	Was a second of the second of				
W	(1) 4 second (2) 2 second (1) Sui (1)				

Question No.	Questions Questions				
90.	A particle moves along y axis represented as $y = 3 + 4 \cos wt$. The motion of the particle is				
	(1) not S.H.M (2) Oscillatory but not S.H.M				
	(3) S.H.M (4) rotatory				
91.	If a charged particle moving in a uniform magnetic field looses 4% of its kinetic energy, radius of curvature of its path changes by				
bse	(1) 2% (2) 4%				
	(3) 10% (4) 7.5%				
92.	A length ℓ of a wire is bent to form a circular coil of some turns. A curl is passed through it and it is placed in a magnetic field B. The maximum acting on the coil is				
	(1) $1 B \ell^2$ (2) $4 \pi I B \ell^2$				
	(3) $I \ell^2 B_{4\pi}$ (4) zero				
93.	An atom is paramagnetic if it has				
	(1) an electric dipole moment (2) no magnetic moment				
eutra.	(3) a magnetic moment (4) no electric dipole moment				
94.	The couple acting on a magnet of length 10 cm and pole strength 15 kept in a filed $B = 2 \times 10^{-5}$ T at an angle of 30° is				
	(1) $1.5 \times 10^{-5} \text{ Nm}$ (2) $1.5 \times 10^{-3} \text{ Nm}$				
	(3) $1.5 \times 10^{-2} \text{ Nm}$ (4) $1.5 \times 10^{-6} \text{ Nm}$				
95.	A fan blade of length $1/\sqrt{\pi}$ meter rotates with a frequency 5 cycles/sec				
para	perpendicular to a magnetic field 10 tesla. The potential difference between the centre and end of the blade is				
la 1	(1) -50 V (2) $+50 \text{ V}$ (3) -2.0 V (4) $+0.02 \text{ V}$				
	(3) -2.0 V $(4) +0.02 V$				

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Physics (Physics) (Physics)

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Question No.	Questions
96.	The self inductance of an air core solenoid of 80 cm length and 500 turns each of circular cross-section with 2 cm diameter is
	(1) 150.6 μH (2) 162.2 μH
	(3) 123.3 μH (4) 102.5 μH
97.	An a.c. source V = 100 sin 100 πt is connected to a resistor of 20 Ω . The rms value of current through the resistor is
	(1) 10 A (2) $\frac{10}{\sqrt{2}} \text{ A}$
	(3) $\frac{5}{\sqrt{2}}$ A (4) $\frac{7}{\sqrt{2}}$ A
98.	A voltage signal is represented as $V=220\sqrt{2}\cos{(50\pi)}t$. How many times will the current be zero in one second
	(1) 50 (2) 100
	(3) 33 (4) 67
99.	The reactance of a capacitor (10 pF) connected across a d.c. source is
	(1) zero (2) infinity
	(3) $10^4 \Omega$ (4) $10^7 \Omega$
100.	The electric field 'E' and the magnetic field 'B' in an electromagnetic wave are
2	(1) parallel to each other (2) inclined at an angle of 45°
	(3) perpendicular to each other (4) popposite to each other

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(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
- 3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing within two hours after the test is over. No such complaint(s) will be entertained thereafter.
- 4. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let.
- 5. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 6. Use only Black or Blue <u>BALL POINT PEN</u> of good quality in the OMR Answer-Sheet.
- 7. BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULDES ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE INTO MINUTES AFTER STARTING OF THE EXAMINATION.



Question No.	Questions 401)65454					
1.	If the binding energy/nucleon in Li ⁷ and He ⁴ nuclei are 5.60 MeV and 7.06 MeV respectively, the energy of the reaction					
	$Li^7 + p \rightarrow 2He^4$ will be					
	(1) 19.6 MeV (2) 2.4 MeV					
	(3) 8.4 MeV (4) 17.28 MeV					
2.	The count rate of a radioactive nuclei falls from 992 counts/minute to 62 counts/minute in 10 hour. The half-life of the element is					
	(1) 1 hour (2) 2.5 hours					
	(3) 5 hours (4) 6 hours					
3.	The nucleus ²⁴² Pu ₉₄ decays to ²⁰⁶ Pb ₈₂ by emitting					
≥ χ > θ; 4. 44.	(1) 9α and 12β particles (2) 6α and 9β particles					
	(3) 9α and 6β particles (4) 6α and 12β particles					
4.	On an atomic scale, which of the following polarisation is important?					
	(1) electronic only (2) ionic only					
	(3) orientational only (4) both ionic and orientational					
5.	At a frequency less than the plasma frequency, the collision losses cause					
	(1) total internal reflection					
	(2) wave attenuation					
	(3) partial reflection					
her	(4) both attenuation and partial reflection					
	Average Average					

Question No.	anotiesus Questions				
6.	The minimum energy possessed by a particle confined to a one dimensional box of length L is				
	(1) 0 (2) $\frac{h^2}{(8\pi^2 \text{ m L}^2)}$				
minute to	(3) $\frac{\hbar^2}{(8\pi^2 \mathrm{m}\mathrm{L}^2)}$ (4) $\frac{\mathrm{mv}^2}{2\mathrm{L}}$				
7.	The width of the spectral line resulting when an atom in an excited state of life time 10 ⁻⁸ sec. returns to the ground state is				
	(1) $0.33 \mathrm{m}^{-1}$ (2) $0.33 \mathrm{cm}^{-1}$				
	(3) 33 m ⁻¹ (4) 33 cm ⁻¹				
8.	The expected value of P for the wave function $\psi(x) = \sqrt{\frac{2}{L}} \sin \frac{\pi x}{L}$; is				
f inst	(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) infinity				
9.	The particles described by anti symmetric wavefunctions obey				
	(1) Maxwell Boltzmann Statistics (2) Bose-Einstein Statis	stics			
esuso sause	(3) Fermi-Dirac Statistics (4) All the three before				
10.	Born approximation can be used				
	(1) only within very low energy limits				
	(2) only within high energy limits and toolige latting (8)				
	(3) in both very low as well as high energy limits	A 0.1 A			
	(4) none of the three before				

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Question No.	n anolason Questions noltage				
11.	If a charged particle moving in a uniform magnetic field looses 4% of its kinetic energy, radius of curvature of its path changes by				
	(1) 2%	(2)	4%		
	(3) 10%	(4)	7.5%		
12.	A length ℓ of a wire is bent to form a circular coil of some turns. A cur I is passed through it and it is placed in a magnetic field B. The maxin torque acting on the coil is				
	(1) $1 B \ell^2$	(2)	$4 \; \pi \; I \; B \; \ell^2$	benning a Leginder	
10 P	(3) $I \ell^2 B/4\pi$	(4)	zero	will the curre	
13.	An atom is paramagne	etic if it has			
	(1) an electric dipole	moment (2)	no magnet	ic moment	
E 81 - 931	(3) a magnetic mome	nt (4)	no electric	dipole moment	
14.	The couple acting on a kept in a filed $B = 2 \times$	and pole strength 15 Am			
	(1) $1.5 \times 10^{-5} \text{ Nm}$	(2)	$1.5 \times 10^{-3} \mathrm{N}$	Nm	
vevroite	(3) $1.5 \times 10^{-2} \text{ Nm}$	(4)	1.5×10^{-6} N	Vm·	
15.	A fan blade of length	1/_ meter r	otates with	a frequency 5 cycles/sec	
701	perpendicular to a magnetic field 10 tesla. The potential difference between the centre and end of the blade is				
gami su	(1) -50 V	(2)	. FOTT		
	(3) -2.0 V	(4)	+0.02 V		
16.	The self inductance of an air core solenoid of 80 cm length and 500 t each of circular cross-section with 2 cm diameter is				
	(1) 150.6 μH	(2)	$162.2\mu H$	(3) ± of man	
Mary	(3) 123.3 µH	(4)	$102.5\mu\mathrm{H}$	Anau Sur	

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Question No.	Questions	Question Dis.	
17.	An a.c. source $V=100 \sin 100 \pi t$ is connected to a resistor of 20 Ω . Trms value of current through the resistor is		
	(1) 10 A (2) $\frac{10}{\sqrt{2}} \text{ A}$ (2)		
nwari sunozei	(3) $\frac{5}{\sqrt{2}}$ A (4) $\frac{7}{\sqrt{2}}$ A		
18.	A voltage signal is represented as $V = 220 \sqrt{2} \cos(50\pi) t$. How many times will the current be zero in one second		
	(1) 50 (2) 100		
	(3) 33 (4) 67		
19.	The reactance of a capacitor (10 pF) connected across a d.c. s	ource is	
FA BL 6	(1) zero (2) infinity		
	(3) $10^4 \Omega$ (4) $10^7 \Omega$		
20.	The electric field 'E' and the magnetic field 'B' in an electromagare	gnetic wave	
08/89/04	(1) parallel to each other (2) inclined at an ang	gle of 45°	
rowinded ((3) perpendicular to each other (4) opposite to each	other	
21.	The shortest height of a vertical mirror required to see the en of a man, will be	ntire image	
arung (90)	(1) $\frac{1}{3}$ of man's height (2) $\frac{1}{2}$ of man's height	* 1817	
2	(3) $\frac{2}{3}$ of man's height (4) equal to man's height	6m	
RMA	word Thum		

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Question No.	anoliza Questions noise and average and av
22.	If 'C' is the velocity of light in vacuum, then the time taken by the light to travel through a glass plate of thicknesss 't' and refractive index ' μ ' is (1) $t_{\mu C}$ (2) $t_{\mu C}$
Solt-dri	(1) μC (2) μC (3) $\mu t / C$ (4) μC
23.	A thin prism of angle 6° made of glass of refractive index 1.5 is combined with another prism of glass with $\mu=1.75$ so as to produce dispersion without deviation. The angle of second prism is
	(1) 7° (2) 4.67°
ddwma	(3) 9° (4) 5° (4) (5° (5) (6) (6) (6) (6) (6) (6) (6) (6) (6) (6
24.	A simple microscope consists of a concave lens of power -10 D and a convex lens of power $+20$ D in contact. If the image formed is at infinity, then the magnifying power (D = 25 cm) is
	(1) 2.5 (2) 3.5
35	(3) 2.0 (4) 3.0
25.	A symmetric double convex lens is cut in two equal parts along its diameter. If the power of original lens was 4D, the power of divided lens will be
	(1) 2 D (2) 3 D
	(3) 4 D (4) 5 D
26.	If the resolution limit of the eye is 1 minute and at a distance x km from the eye, two persons stand with a lateral seperation of 3 meters, then value of x for which the two persons can be resolved by naked eye is
	(1) 10 km (2) 15 km
was	(3) 20 km (4) 30 km Awen Ru

Question No.	anoite Questions OA
27.	If the Young's double slite experiment is performed in water, then (1) the fringe width decreases (2) the fringe width increases (3) the fringe width does not change (4) there will be no fringes
28.	If n coherent sources of intensity \mathbf{I}_0 are super imposed at a point, the intensity of the point is
based ersion	(1) $n I_0$ (2) $n^2 I_0$ (3) $n^3 I_0$ (4) I_0/n
29.	In Fresel's biprism experiment, the distance between biprism and screen is 4 m. The angle of the prism is 2×10^{-3} radian and the refractive index of glass of the biprism is 1.5. The fringe width observed on the screen is 15×10^{-4} m. The number of fringes on the screen is
20	(1) 3 (2) 2 (3) 6 (4) 8
30.	If σ is surface charge density and \in is electric permittivity, the dimensions of σ_{\in} are same as
23	(1) electric force (2) electric field intensity (3) pressure (4) charge
31.	A pair is constrained to move along the inner surface of a hemisphere, then the number of degrees of freedom of the particle is
7	(1) one (2) two (3) four (4) three There

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Question Questions No. For a conservative system, the potential energy is 32. (1) coordinate and velocity dependent (2) coordinate dependent and velocity independent (3) coordinate independent and velocity dependent coordinate and velocity independent The distance time graph of a particle at time t makes an angle 45° with 33. respect to time axis. After one second, it makes angle 60° w.r.t. to time axis, what is the acceleration of the particle (2) $\sqrt{3} + 1$ unit (1) $\sqrt{3} - 1$ unit (4) 1 unit (3) $\sqrt{3}$ unit A ball kept in a box (closed), moves in the box colliding with the walls. If 34. the box is kept on a smooth surface, the centre of mass of the (1) box remains constant (2) box and the ball system remains constant (3) ball remains constant (4) ball relative to the box remains constant Centre of mass of a semicircular plate of radius R, the density of which 35. linearly varies with distance being d at the centre to 2d at the circumference is $3R_{\pi}$ from the centre (2) $4R_{3\pi}$ from the centre $5R_{\pi}$ from the centre (4) $7R_{5\pi}$ from the centre

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all the three before

Then

(3)

(4)

36.

C-shoJ

(1) the centre of rod follows a straight line path

(2) the centre of mass follows circular path

A uniform rod is placed vertically on a smooth surface and then released.

the instantaneous axis is passing through the point of contact

No.	Question	ns Political	
37.	In case of a radioactive decay, if the parent nucleus is initially at then after decay, the centre of mass will		
	(1) move on a straight line (2) m	ove in a circle	
	(3) remain at rest (4) fo	llow a parabolic path	
38.	Two pendulums of length ℓ_1 and ℓ_2 start vibrating. If at some instant, the two are in mean position in the same phase, then after how many vibration of the shorter pendulum, the two will be in phase in the mean position $[\ell_1, > \ell_2; \ell_1 = 121 \text{ cm. } \ell_2 = 100 \text{ cm.}]$		
	(1) 11 (2) 10		
th alli	(3) 9 (4) 8		
39.	A solid copper sphere suspended from a massless spring has a time period of 4 second. The sphere is completely immersed in a liquid having density 0.125 times that the brass. If the sphere remains in the liquid during oscillations, the time period will be		
	0.125 times that the brass. If the sphoscillations, the time period will be	ere remains in the liquid during	
daids	0.125 times that the brass. If the sphoscillations, the time period will be	mersed in a liquid having density ere remains in the liquid during second	
daids and t	0.125 times that the brass. If the sphoscillations, the time period will be (1) 4 second (2) 2	ere remains in the liquid during	
40.	0.125 times that the brass. If the sphoscillations, the time period will be (1) 4 second (2) 2	ere remains in the liquid during second	
40.	0.125 times that the brass. If the sphoscillations, the time period will be (1) 4 second (2) 2 (3) 3 second (4) 4. A particle moves along y axis represent of the particle is	ere remains in the liquid during second	
40.	0.125 times that the brass. If the sphoscillations, the time period will be (1) 4 second (2) 2 (3) 3 second (4) 4. A particle moves along y axis represent of the particle is (1) not S.H.M (2) One of the particle is	ere remains in the liquid during second 75 second ed as $y = 3 + 4 \cos wt$. The motion	
	0.125 times that the brass. If the sphroscillations, the time period will be (1) 4 second (2) 2 (3) 3 second (4) 4. A particle moves along y axis represent of the particle is (1) not S.H.M (2) O (3) S.H.M (4) ro As the interatomic distance in a solid is energy hand	second 75 second ed as y = 3 + 4 cos wt. The motion scillatory but not S.H.M tatory ncreases, the width of an allowed	
besset	0.125 times that the brass. If the sphroscillations, the time period will be (1) 4 second (2) 2 (3) 3 second (4) 4. A particle moves along y axis represent of the particle is (1) not S.H.M (2) O (3) S.H.M (4) ro As the interatomic distance in a solid is energy band	second 75 second ed as y = 3 + 4 cos wt. The motion scillatory but not S.H.M	

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Question No.	Questions		
42.	The atomic packing factor for a bcc metal structure is		
	(1) 0.68 validade (2) 0.74 montandin-q (1)		
	(3) 0.50 TeneS (1) (4) 1.00 mmos (8)		
43.	Which of following reveal crystallographic structure of a solid?	49.	
pt.	(1) α-rays (2) β rays		
	(3) γ rays (4) X rays		
44.	The 1st brillouin zone of simple cubic lattice is		
	(1) rhombic decahedron (2) truncated octahedron		
	(3) parallelopiped (4) cube		
45.	Bipolar logic families employ		
	(1) junction field effect transistor (2) p-n junctions		
adlas 14	(3) n-p-n transistors (4) MOSFETs		
46.	A Schottky transistor when used as a switch switches between	apace	
	(1) cut-off and saturation regions		
	(2) cut-off and active regions		
Objects	(3) active and saturation regions		
	(4) different operating points in active region	nom.	
47.	The most commonly used configuration of a transistor as a switch is		
4	(1) CB (2) CC		
	(1) CB (3) CE (2) CC (4) CB or CC Arren &	u	

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Question No.	enone Questions	estion No.	
48.	Which of the following diodes is used for fastest switching		
	(1) p-n junction (2) Schottky		
	(3) Vacuum (4) Zener (8)		
49.	The time required to go from ON to OFF in a p-n junction diode is to	equal	
	(1) zero (2) switching time		
	(3) transition time (4) storage time		
50.	In case of a MOSFET, the gate current	- No.	
	(1) is negligibly small		
	(2) increases with increase in drain voltage		
	(3) decreases with decrease in drain voltage		
	(4) is dependent on drain current		
51.	The average power per unit area at a distance of 2 m from a small emitting 20 W of EM radiations uniformally in all directions is	bulb	
10.	(1) 0.69 W/m^2 (2) 0.56 W/m^2		
	(3) 0.78 W/m^2 (4) 0.39 W/m^2 by 0.39 W/m^2		
52.	The ratio of wavelengths associated with a proton and an alpha paraccelerated through same potential is	rticle	
a li	(1) 2 $\sqrt{2}$		
44	(3) 4 (4) $\frac{1}{2\sqrt{2}}$ June $\frac{50}{2}$	دا	

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Question No.	questions		
53.	The momentum of a photon with energy equal to rest energy of an is		
	(1) zero AAOS	(2) $2.73 \times 10^{-2} \text{ kg ms}^{-1}$	
	(3) $1.99 \times 10^{-24} \text{ kg ms}^{-1}$	(4) infinite	
54.	The graph between frequer is	ncy of incident light and the stopping	
64.4	(1) parabola	(2) straight line	
	(3) hyperbola	(4) circle	
55.		iations of 662.6 nm pulses of duration J, the numbr of photons produced a	
	(1) 1.3×10^9	(2) 1.3×10^{18}	
	(3) 1.3×10^{27}	(4) 3.9×10^{18}	
56.		the distance between Mars and the vill it take to send a radio message from this situation?	m a spac
	(1) 5 sec	(2) 200 sec	
	(3) 0.2 sec	(4) 500 sec	
57.	How many different wavel	lengths may be observed in the spectroms are excited to third excited state	rum from
57.	How many different wavel	lengths may be observed in the spectroms are excited to third excited state	rum from

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Question No.	Pestions	Questions		estion No.
58.	For a single ionised helium ator will absorb	n, the longe	st wavelength in gro	ound state
	(1) 912 A° (1) (1) (1) (1)	(2) 304 A	0798 (
	(3) 606 A°	(4) 1216	A°	
59.	z component of an orbital angula number is	r momentu	m is $\frac{h}{\pi}$, its magnetic	quantum
	(1) 1 in a tand dejecte (E	(2) 2.		
	(3) -1	(4) 0		
60.	If the uncertainty in the positive wavelength, the minimum unce (1) $\frac{1}{4\pi}$	rtainity in t	the velocity would be	
Bit day	(3) $\sqrt[4]{4\pi}$ m	$(4) \frac{mv}{4\pi}$	P01 × 6.1 (
61.	When only s-wave scattering takes place, then the ratio of total sca quantum-mechanically to the cross-section classically for the same is			
	(1) 2	(2) 4		
n mont	(3) $\frac{1}{2}$	(4) 1/4		H AV
62.	The Stern-Gerlach experiment	proves the	existance of	W
	(1) electronic charge	(2) electr	onic depole moment	
	(3) electronic spin	(4) electr		nhu

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Question No.	Questions	(Question No.
63.	For the wavefunction $\psi_n = A \sin \frac{n \pi x}{a}$ confined to $0 < x < a$ normalization constant is	
	(1) $\sqrt{\frac{2}{a}}$ (2) $\sqrt{\frac{a}{2}}$	
	(3) $\frac{2}{a}$ (4) $\frac{a}{2}$	
64.	Entropy of the universe tends to be	
746	(1) minimum (2) zero	
#10 553 E	(3) constant (4) increasing always	X - X -
65.	The internal energy of an isolated system	
	(1) remains constant (2) is zero	
177	(3) infinite (4) none of the three befo	re
66.	The number of degrees of freedom of a gas is F, then the va	lue of γ is
erijealika Usalai oz	(1) $1 + \frac{2}{F}$ (2) $\frac{2}{F}$	
	(3) $\frac{F}{2} + 1$ masses (4) (4) zero masses (5)	
67.	The work done when a gram-molecule of a gas expends iso 27° C to double it original volume is $[R = 8.3 \text{ J k}^{-1} \text{ mole}]$	
	(1) 725.8 Joule (2) 1725.8 Joule	
40	(3) -725.8 Joule (4) zero	6u

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Question No.	Questions	Question No.	
68.	In quantum statistics, the value of occupation index is		
	(1) equal to 1 (2) equal to or greater than 1		
	(3) equal to or less than 1 (4) less than 1		
69.	The specific heat of saturated steam is always		
	(1) positive (2) zero		
10.	(3) negative (4) infinite		
70.	The unit of entropy is		
	(1) J k (2) J k ⁻¹		
	(3) J (4) N m ⁻² magazinim (1)		
71.			
	(1) zero $ (2) \frac{\lambda \ell}{4\pi \epsilon_0} a^2 $		
	(3) ∞ (4) $\frac{\lambda}{4} \in \pi \ell$		
72.	An electron is projected with a velocity of 10 ⁷ m/s at an angle 30° horizontal in a region of uniform electric field of 5000 N/C vupwards. The maximum distance covered in vertical direction about level will be	ertically	
	(1) 14.2 mm (2) 15 mm		
	(3) 12.6 mm (4) 14.2 cm		
73.	A surface $S = 10\hat{j}$ is kept in an electric field $E = 2\hat{i} + 4\hat{j} + 7\hat{k}$. The electric flux through the surface will be		
	(1) 40 units (2) 50 units		
	(3) 30 units (4) 20 units fra 6	n	

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Question No.	Questions
74.	Two drops of water each with a charge of 3×10^{-9} C having surface potential 500 V form a single drop. The surface potential of the new drop is
	(1) 794 V (2) 1000 V
	(3) 250 V (4) 750 V
75.	The electric field intensity at a point at a distance 20 cm on a line making an angle 45° with the axis of a dipole of moment $10 \text{ C} - \text{m}$ is
lioo s	(1) $1.77 \times 10^{13} \text{ V/m}$ (2) $0.177 \times 10^{13} \text{ V/m}$
ledict.	(3) $17.7 \times 10^{13} \text{ V/m}$ (4) $177 \times 10^{13} \text{ V/m}$
76.	Two capacitors A and B having capacitance 10 μF and 20 μF respectivel are connected in series with a 12 V battery. The ratio of charges on A an B is
	$(1) 0.5 \cdot 1$ $(2) 1 \cdot 1$
	(1) 0.5:1 (2) 1:1 (2) 2:1
	(3) 2:1 (4) 1:1.5
77.	(3) 2:1 (4) 1:1.5 The force acting upon a charged particle kept between the plates of
77.	(3) 2:1 (4) 1:1.5 The force acting upon a charged particle kept between the plates of charged capacitor is F. If one of the plates of the capacitor is removed force acting on the same particle will be
77.	(3) 2:1 (4) 1:1.5 The force acting upon a charged particle kept between the plates of charged capacitor is F. If one of the plates of the capacitor is removed force acting on the same particle will be
77. 78.	(3) $2:1$ (4) $1:1.5$ The force acting upon a charged particle kept between the plates of charged capacitor is F. If one of the plates of the capacitor is removed force acting on the same particle will be (1) 0 (2) $\frac{F}{2}$
noiqui	(3) 2:1 (4) 1:1.5 The force acting upon a charged particle kept between the plates of charged capacitor is F. If one of the plates of the capacitor is removed force acting on the same particle will be (1) 0 (2) F/2 (3) F (4) 2 F A 5°C rise in temperature is observed in a conductor when current is passed through it. If the current is doubled, the rise in temperature will be accordance of the capacitor is removed force acting on the same particle will be

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Question No.	Anolygonic Questions . held	Ques N		
79.	The current changes to 0.25 A as resistance is increased to 5 of the cell is			
	(1) 1 V (2) 1.5 V			
10	(3) 2 V (4) 2.5 V			
80.	Two heater coils of same material are connected in parallel across mains and the length and diameter of one coil is double that of the Which one will produce more heat			
70	(1) thinner coil (2) thicker coil	1		
	(3) both will produce same amount of heat (4) can't predi-	ct		
81.				
31.8	$(1) \frac{YA}{L} \qquad \qquad (2) \frac{YA}{2L}$			
	$(3) \frac{2YA}{L} \qquad \qquad (4) \frac{YL}{A}$			
82.	The dimensions of Poisson's ratio are			
	(1) $[M^{\circ} L^{\circ} T^{\circ}]$ (2) $[M L^{-1} T^{-2}]$			
	(3) $[M L^2 T^{-4}]$ (4) $[M L^2 T^{-3}]$			
83.	The temperature at which the phase transition occurs depends upo	n		
	(1) pressure (2) volume			
Server on	(3) density (4) mass			
84.	The temperature of H ₂ at which the rms velocity of its molecules is seven times the rms velocity of the nitrogen molecules at 300 k is			
	(1) 2100 k (2) 1700 k			
	(3) 1350 k (4) 1050 k Quan Ru	v		

Hend Department of Physics M.D. University, Rohtak (16)

Question No.	Questions				
85.	How many cylinders of hydrogen at atmospheric pressure are required to fill a balloon of volume 500 m ³ , if the hydrogen is stored in cylinders of 0.05 m^3 at an absolute pressure of $15 \times 10^5 \text{ Pa}$?				
	(1) 700	(2) 675			
	(3) 605	(4) 710			
86.	If the temperature of 3 moles of helium gas is increased by 2k, then the change in internal energy of the gas is				
	(1) 70.0 J	(2) 68.2 J			
	(3) 74.8 J	(4) 78.2 J			
87.	One mole of a gas isobarically heated by 40 k receives heat 1.162 kJ. The ratio of specific heats of the gas is				
	(1) 1.7	(2) 1.4 (2) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4			
	(3) 1.3	(4) 1.5 (4) (1)			
88.	A carnot engine first operates between 200°C and 0°C and then between				
119.	0°C and 200°C. The ratio of efficiencies (η_2/η_1) in two cases is				
1000m	(1) 1:15	(2) 1:1 dila (e) esistamo esit			
	(3) 1:2	(4) 1.73:1			
89.	The propagation of heat in air takes place by				
Tuis.	(1) conduction	(2) convection			
	(3) radiation	(4) all the three before			
90.	The ratio of rate of radiation of energy by two spheres of same material having radii r and 4r and temperature $2T_0$ and T_0 respectively is				
	(1) 1:1	(2) 1:2			
	(3) 2:1	(4) 3:1 Juan Ru			

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Question No.	Questions	e la				
91.	For a conservative system, generalized force (1) has necessarily the dimensions of force (2) is a dimensionless quantity (3) can not have dimensions of force (4) may have dimensions of torque Mutual interaction forces between two particles can change (1) the linear momentum but not the kinetic energy (2) the kinetic energy but not the linear momentum (3) the linear momentum as well as kinetic energy					
93.	(4) neither the linear momentum nor the kinetic energy If the Lagrangian does not depend on time explicitly (1) the Hamiltonian is constant (2) the Hamiltonian can not be constant (3) the kinetic energy is constant (4) the potential energy is constant					
94.	The ecentricity (e) of the orbit of a satellite having maximum and minimum velocities as v_1 and v_2 is (1) $\frac{v_1}{v_2}$ (2) $\frac{v_2}{v_1}$ (3) $\frac{v_1-v_2}{v_1+v_2}$ (4) $\frac{v_1+v_2}{v_1-v_2}$	n J				
95.	For a one dimensional oscillator, the representative point in dimensional phase space traces (1) an ellipse (2) a parabola (3) a hyperbola (4) always a straight line 2015 (Physics)-Code-D	tw				

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Question No.	Questions For a particle at rest in a rotating frame, the pseudo force acting on it in is				
96.					
	(1) zero (2) only centrifugal force				
	(3) only coriolis force (4) both centrifugal and coriolis force				
97.	If constraint forces do work and total mechanical energy is not conserved then constraints are named as				
	(1) bilateral constraint (2) unilateral constraint				
	(3) dissipative constraint (4) regenerative constraint				
98.	A force $\vec{F} = -\vec{\nabla} u$ is said to be conservative if				
	(1) grade F is zero (2) div F is zero				
	(3) Curl F is zero (4) none of three before				
99.	Which of the following is not an explicit function of time				
	(1) velocity (2) momentum				
	(3) acceleration (4) potential energy				
100.	If external torque on a system is zero, then its angular velocity				
	(1) remains unchanged only if moment of inertia changes				
	(2) changes only if moment of inertia remains unchanged				
	(3) remains unchanged only if moment of inertia remains fixed				
	(4) none of the three before Awam (1)				

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Answer Keys M.Se. (Physics)

S.No.	A	В	С	D
1	4	24	2	4
2	2	2~	1	2
3	1	1~	1	3
4	4	2~	1	1
5	1.	4~	1	3
6	2.	1~	2	2
7	3	3 ~	2	1
8	3	1~	1	1
9	4	1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /	2	3
10	3.	3~	2	2
11	2	3 V 2 V	1	1
12	2.	1~	1	3
13	1.	4~	1	1
14	2.	42	4	1
15	4	3 V	2	1
16	1	2	3	3
17	3	3 6	2	3
18	1	3~	4	1
19	1	2 ~	4	2
20	3.	1 ~	1	3
21	1	42	4	2
22	1.	2~	2	3
23	1.	3~	1	2
24	4	1~	4	1
25	2.	31/	1	3
26	3	2~	2	1
27	2.	1 🗸	3	1
28	4.	1~	3	2
29	4	3 V	4	3
30	1	2	3	2
31	2-	1	2	2
32	3	3 ~	1	2
33	2	1	4	1 .
34	1	1	4	2
35	3	1	3	4
36	1	3 L	2	1

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	. 0			
37	1	3~	3	3
38	2	10	3	1
39	3	22	2	1
40	2	32	1	3
41	2	2~	4	2
42	1	3~	1	1
43	1	2~	2	4
44	1	1~	2	4
45	1	3 V	2	3
46	2	1	2	2
47	2	1 V	4	3
48	1	2V	2	3
49	2	3 ~	2	2
50	2	2.2	2	1
51	1	1	2	4
52	3	11	3	1
53	1	11	2	2
54	1	41	1	2
55	1	22	3	2
56	3	3~	1	2
57	3	2~	1	4
58	1	4~	2	2
59	2	4~	3	2
60	3	1V	2	2
61	4	22	4	2
62	1	11	2	3
63	2	1	3	1
64	2	1~	1	4
65	2	1~	3	1
66	2	2~	2	1
67	4	21	1	2
68	2	11	1	2
69	2	2~	3	3
70	2	21	2	2
71	4	4~	2	2
72	2	1~	3	1
73	3	2 V	1	1

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1	2~	4	1
3	21	1	1
2	2 ~	1	2
1	4~	2	2
1	2~	2	1
3	2 ~	3	2
2	2~	2	2
2	4~	2	1
3	2	2	1
1	1	1	1
4	4~	2	4
1	1~	4	2
1	2~	1	3
2	3~	3	2
2	3 V	1	4
3	4 ~	1	4
2	3.~	3	1
2	22	1	4
1	3 ~	3	2
4	1 4	1	1
4	4 W	1	4
3	1 ~	1	1
2	1 1	3	2
3	20	3	3
3	2 0	1	3
2	3 ~	2	4
1.	2	3	3
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