ENTRANCE EXAMINATION-2017

M.Sc (PHYSICS)
[Set B]

ROLL NO. M2 5 3 1 3 0 6

Time: 1 Hour 45 Minutes

Signature of Invigilator Total Marks: 100

Instructions to Candidates

- Do not write your name or put any other mark of identification anywhere in the OMR Answer Sheet. IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR ANSWER SHEET, the OMR sheet will be cancelled, and will not be evaluated.
- 2. This Question Booklet contains this cover page and a total of 100 Multiple Choice Questions of 1 mark. Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
- Each correct answer carries one mark.
- 4. There is negative marking in Multiple Choice Questions. For each wrong answer 0.25 marks will be deducted.
- 5. USE OF CALCULATOR IS NOT PERMITTED.
- 6. USE/POSSESSION OF ELECTRONIC GADGETS LIKE MOBILE PHONE, iphone, iPad, pager ETC. is not permitted.
- 7. Candidate should check the serial order of questions at the beginning of the test. If any question is found missing in the serial order, it should be immediately brought to the notice of the Invigilator. No pages should be torn out from this question booklet.
- 8. Answers must be marked in the OMR answer sheet which is provided separately. OMR answer sheet must be handed over to the invigilator before you leave the seat.
- 9. The OMR answer sheet should not be folded or wrinkled. The folded or wrinkled OMR/Answer Sheet will not be evaluated.
- 10. Write your Roll Number in the appropriate space (above) and on the OMR Answer Sheet. Any other details, if asked for, should be written only in the space provided.
- 11. There are four alternative answers to each question marked A, B, C and D. Select one of the answers you consider most appropriate and fill up the corresponding oval/circle in the OMR Answer Sheet provided to you. The correct procedure for filling up the OMR Answer Sheet is mentioned below.
- 12. Use Black or Blue Ball Pen only for filling the ovals/circles in OMR Answer Sheet while answering the Questions. For your Choice of answers darken the correct oval/circle completely. If the correct answer is 'B', the corresponding oval/circle should be completely filled and darkened as shown below.

CORRECT METHOD

(A) (C) (D)

WRONG METHOD

(A) ★ (C) D (A) ★ (C) D (A) D (D) D (D)

1. In electrostatics a field line and an equipot	tential surface are	
(A) Always perpendicular		
(B) Always parallel		
(C) Makes any possible angle		
(D) None of the above		
2. If a dielectric is inserted between the plate	es of an air filled capacitor, the capacita	nce will
•(A) Increase		
(B) Decrease		
(C) Remain same		
(D) May increase or decrease depend	ding upon type of dielectric	J (
3. A capacitor stores .076 Coulombs of char	ge at 10 V. It's capacitance is	A 500 10 0
(4) 7 ()	(B) 0.76 F	0/3 V/
(A) 7.6 F · (C) 0.00076 F	(D) 0.0076 F	
(C) 0.00076 F	(D) 0.0070 I	~ 1N \
4. Which of the following electrostatic prob	lems can be solved exactly?	Q 2/2 0.0%
(A) A charge placed above a ground	ed infinite conducting plane	
(B) A charge placed away from a gro	ounded conducting sphere	7 (, e
(C) None of (A) & (B)		2 =
(D) Both of (A) & (B)		1 222
5. The materials having low retentivity is su	nitable for making	1 2 c 2 c 2 c 2 c 2 c 2 c 2 c 2 c 2 c 2
X	14 41	1 0
(B) A temporary magnet	1.1	= "
(B) A temporary magnet ♥ ⟨ →	ror soft 110	21
(C) Weak magnets •		•
(D) None of the above		
6. Ferrites are which type of materials		
(A) Paramagnetic	(B) Diamagnetic	
•(C) Ferromagnetic	(D) None of the above	
7. What is the reluctance of air gap as comp	pared to same gap filled with iron	
(A) Reluctance of air gap is much lo	ower as compared to iron	
•(B) Reluctance of air gap is much hi	igher as compared to iron	
(C) Reluctance of air gap is slightly	lower as compared to iron	
(D) Reluctance of air gap is slightly	higher as compared to iron	
8. The Biot-Savart's law is a general modifi	ication of	
	-112= 0	
(A) Kirchhoff's law	7	
(B) Lenz's law		
'(C) Ampere's law		
(D) Faraday's law		
, 11		
2 200	: CETD . (D16012 1
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			WE M(BL)	9(20)
100	- 24		M= m L	
1 /		-2L-1	N	
		4		
	9. A rectangular magnet of magnetic moment N moment of each piece will be	I is cut into two pieces	of same length, the	e magnetic
	(A) M	· (D) 3.6/2		mx.
٠,	(C) 2M	(B) M/2—	2.0	
);		(D) M/4	MIM	
	10. Energy stored in an inductor of inductance	L carrying a current Lie	·······································	
	경기 가지 않는 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니는 아니	e carrying a current 1 is		mb
- 1	(A) ${}^{1}\!\!/_{2}LI^{2} \stackrel{\bullet}{}^{\bullet}$ (C) ${}^{1}\!\!/_{2}L^{2}I^{2}$	(B) $\frac{1}{2}L^{2}I$		-VI dui
	(C) $\frac{1}{2}L^{2}I^{2}$	(D) ½LI	- 12	Ny
	11. In an alcotus-way to the			110
	11. In an electromagnetic wave in free space			
-3	(A) F and R fields are in whose and		<u>.</u>	
	(A) E and B fields are in phase and perp (B) E and B fields are out of phase by 9	Dendicular	>>	
	(C) E and B fields are in phase and para	o and perpendicular)	
- 1	(D) E and B fields are out of phase by 9	iller		
H	(=) = said 2 Metas are out of phase by 9	o and paramer	,	
	12. Divergence of magnetic field is zero. This s	statement implies		
		mpnes		
	(A) Absence of magnetic monopole			
ال	(B) Absence of magnetic quadrupole			
	(C) Presence of magnetic monopole			
	(D) Presence of magnetic quadrupole			
	13. In a system of charged particles in an EM fi	ield, which of the follow	ving statement is co	rrect?
	6-11d1		, ح. اموس	
	(A) Total linear momentum of all the charged partial energy of all the charged partial energy.	iarged particles is conse	ived –	
	(C) Both A & B	icies is conserved		
	(D) None of A & B			
	14. Electromagnetic waves are transverse in na			
	(A) Reflected		. 0/	
	(B) Refracted	,) are	
	(C) Diffracted	Flor	is the second	
	(D) Polarized •	, of per		
	7	a work of 1		
	15. Poynting vector gives	A water of hear		
	• EM field	P- E	Ma	1.1
	(A) Energy density in a given EM field	field A	A	
	(B) Energy flux density in a given EM f	field &	F	
	(C) Momentum density in a given EM f (D) Momentum flux density in a given	EM field		
	(D) Momentum flux delisity in a given	•	Vr	
	16. A square matrix through similarity transform	mation can always be	4	
		pa >9	41) = 101	
	(A) Diagonalized	(2)		-
	(B) Triagonalized	(,		
	(c) Made an identity matrix			
	(D) Made a null matrix			2017
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determinant	perties, X times multiple of one row	is added to another row, then
		54+2
(A) Remains same		
(B) Becomes X times of or	riginal determinant	
(C) Becomes X/2 times of	original determinant	
(D) Becomes 2X times of c	original determinant	
18. Necessary and sufficient condi	ition for $M(x,y)dx + N(x,y)dy$ to be	total differential is
(A) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (B) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$	3m dx + 3md4	
dx dy	2	
$(B)\frac{\partial A}{\partial y} = \frac{\partial A}{\partial x}$	amax - aroan	2001
$(C)\frac{\partial M}{\partial x}\frac{\partial N}{\partial y}=1$	an Di	M 21 2m = -1
011 03		24
$(D)\frac{\partial M}{\partial v}\frac{\partial N}{\partial x}=1$		
		(194 - Jui)
Integrating factor of equation >	xdy-ydx = 0 is	1= ydxy on - on)
	e' Ka) - Juni
(A) $1/y^2 = (B) 1/(xy)$ (B) $1/(x^2+y^2)$		- 1
(B) 1/(xy)	y to - xay	- 4
(C) 1/(x ² +y ²)×		7
(D) All of above	(1) (-1) dy	-1 = 0 \n
20. Cross product of two vectors is	a dy -1 Py - DIX	-1 = 0) in x = 1 = 1
20. Cross product of two vectors is	2 3	11
(A) Commutative	(pdu P -	1 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
(B) Associative	AXBXBXD 1797 C	-15 dn -1099
(C) Both A & B	•	6 1 101/4 F
•(D) None of A & B		Let was
(31 %-) : 6		2
21. I(2) is a function of a complex	variable z. f(z) is said to be analytic	in a domain D if
(A) f(z) is defined at all poi		A Figure
'(B) f(z) is defined and cont		
(C) f(z) is defined and diffe		Nogx
(D) None of the above		1 1
		, CXC. *
22. Value of $\exp(i3\pi/4)$ where $i = \sqrt{2}$	1-1, is () e 4	
	CAR!	
(A) (-1/\(\frac{1}{2}\)+(1/\(\frac{1}{2}\)i	大大	311 + (21 4 311
(B) (1/√2)+(1/√2)i		45864 . 3
$^{\bullet}$ (C) $(1/\sqrt{2})+(-1/\sqrt{2})i$ (D) $(-1/\sqrt{2})+(-1/\sqrt{2})i$		X, 460
(D) (-1/\2)+(-1/\2)I		
(23 Complex function which is infi	nite valued is	os (90x 14 15) + 1 514(40x 1441)
23 Complex function which is min	inte valued is	1 Sin 45 + 1.51m 49
(A) sin(z) -	4	(1-4)
(B) cos(z)	Cos	52 to 371 34100
(C) exp(2)	-10 Y	11
(D) log(z)	4	135 +
		60) 135
M25 M.Sc Physics	SET B	Cos (90x 1445)
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24. A mapping $w = f(z)$ is conformal at every point where	
24. A mapping w	
(A) f(z) is defined	
(B) f(z) is continuous	
(C) f(z) is analytic	
(D) $f(z)$ is analytic, except at points where derivative $f'(z)$ is zero	
25. If f(z) is analytic in a simply connected bounded domain D, then the integral of f(z) over a simple	
closed path in D is	
(A) Zero •	
(B) ni	
(C) 2πi	
(D) 4πi	
26. An example of a coherent source is	
(A) Two bulbs of same power	
(B) Two LEDs of different power.	
√ (C) One bulb and one LED of same power	
(D) Light coming from a bulb by two different paths	
27. A thin film of oil on water looks coloured due to	
(A) Diffraction of light	
(B) Interference of light	
(C) Scattering of light	
(D) Refraction of light	
20 In a Nilsala and an area of the Calaba area (SN N and N are afficially in Figure 6 - Figure	
 In a Nicole prism made from Calcite crystal, if N_O,N_E and N_B are refractive indices of ordinary ray, extraordinary ray and Canada balsam, respectively, then 	
extraordinary ray and Canada baisam, respectively, then	
$(A) N_0 > N_B > N_E$	
\bullet (B) $N_0 < N_B < N_E$	
$(C) N_0 < N_B > N_E$	
(D) $N_0 > N_8 < N_E$	
M. An anti- min are be found in which type of crystal	
29. An optic axis can be found in which type of crystal	
(A) Simple cubic	
(B) Face centered cubic	
(C) Triclinic•	
(D) Body centered cubic	
O. Blue colour of sky is due to	
(A) Diffraction of light	
/(B) Scattering of light	
(C) Interference of light	
(D) Refraction of light	

31. A circularly polarized light can be resolved into	31. /	1	circula	arly	pol	arized	light	can	be	resol	ved	into
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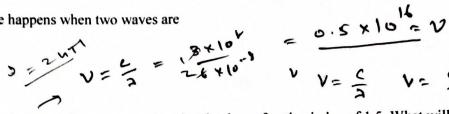
- (A) Two linearly polarized light beams of equal intensity in phase.
- (B) Two linearly polarized light beams of unequal intensity in phase Y
- •(C) Two linearly polarized light beams of equal intensity out of phase by 90°
- (D) Two linearly polarized light beams of unequal intensity out of phase by 90° ×

32. If a white light source is used in Young's double slit experiment, then on the screen

- (A) A narrow white fringe at the center, followed by few coloured fringes on either side
- (B) Black and white alternating fringes with white fringe at the center
- (B) Black and white alternating tringes with dark fringe at the center
 - •(D) A large number of coloured fringes on either side of central fringe

33. Construc ence happens when two waves are

- (A) out of phase
- ←(B) zero amplitude
- (C) in phase
 - (D) in front



34. Çertain light of wavelength 600 nm in vacuum enters glass having refractive index of 1.5. What will be wavelength of light inside glass?

- (A) 900 nm
- (B) 600 nm
- **∢**(C) 400 nm
- (D) 300 nm

35. A 2 level laser

- (A) Is most efficient laser
- (B) Is very difficult to operate
- (C) Does not work
- (D) Has very low power

36. In Schrodinger wave equation the symbol ψ represents the

- (A) wavelength of the spherical wave
- (B) phase of the spherical wave
- (C) frequency of the spherical wave
- (D) none of these

37. In the probabilistic interpretation of wave function the quantity ψ is

- (A) a probability density
- (B) a probability amplitude
 - (C) a probability wavelength
 - (D) a probability frequency

38. In quantum mechanics the expectation value of an operator O representing a dynamical variable is

- (A) smallest of the eigenvalues of O
- (B) largest of the eigenvalues of O
- (C) mean value of all the eigenvalues



(D) mean value of the eigenvalues weighted by probability density × 2=600 5=13 = 0.5 x101

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$$V = \frac{1}{2}$$
 $= \frac{3}{2}$

39. The energy spectrum of a particle bound in a simple harmonic potential is (A) completely continuous (B) both continuous and discrete (C) completely discrete having equidistant levels • (D) completely discrete having non-equidistant levels 40. Phrenfest theorem partially shows the connection between quantum mechanics and (A) photonics (B) electronics (C) special relativity ~ (D) classical mechanics 41. A free particle is (A) bound •(B) unbound (C) both bound and unbound (D) neither bound nor unbound 42. Schrodinger equation truly describes the behaviour of (A) electrons electrons and atoms (B) (C) electrons, atoms and molecules •(D) all particles 43. In quantum mechanical tunnelling, if the barrier width is increased, tunnelling probability will (A) increase slightly (B) increase exponentially (C) decrease slightly (D)• decrease exponentially 44. Which one of the following in an allowed wave function of a single particle pa by - or br (A) (B) $\exp(-x^2)$ 1/x x (D) 5. [px,py] is equal to **(B)**

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•	46. The number of two o	limensional latt	tices are	1 stan	*	
				1) -		
	(A) 3			(B) 5		
	(C) 7			(D) 9		
5	47. The number of cryst.	allographically	equivalent plan	es in the {110} fam	nily of a cubic cr	ystal system is
	(A) 4			(D) 6	14	
	(C) 8			(B) 6 (D) 12		
	48. The potential energy	of a diatomic n	nolecule in term	s of interatomic dis	stance R is given	by
	where A, B, m and n are	U(constants for th	$(R) = -A/R^m + B/R$ The given molecular	/R" le. The equilibrium	separation R _e is	obtained as:
1			6		(.42
1	$(A) (nA/mB)^{1/n-m}$			(B) (nA/mB) ^{1/r} (D) (nB/mA) ^{1/r}	n-n 1	1
1	(C) $(nB/mA)^{1/m-n}$			(D) $(nB/mA)^{1/n}$	n-m	
	 The concentration of by 	Schottky imper	rfections 'n' in a	n ionic solid at a co	ertain temperatu	re T is given
	(A) N exp(- E_p/kT)		(B) N $\exp(E_p/k)$	T)	
	(C) N exp(- $E_p/2k$			(D) N $\exp(E_p/2)$		
	50. The natural cut off fr mass M is given by			•		
	mass with given by		1 14 t=	(B) (4M/K) *	(M)3	4 1 1/2
	(A) (4K/M) *		すりな	(B) (4M/K) [⋆]	4 4	(=)
	(A) (4K/M) [¥] •(C) (4K/M) ^{1/2}			(D) $(4M/K)^{1/2}$		
	51. A crystal is subjected angle of 15°. If the sa diffraction	ame X-ray bean	is used, what i	s the angle corresp	onding to the thi	med at an order mart
	(A) 15° (C) 51°	7 5	, , ,	(B) 31) = d = 1	K M7-2
,	(C) 51	" "		(D) 61	J 14	_
1	52. The lowest energy of	an electron cor	ofined to move i	n a one dimensions	al notential well	of langeth
1	0.75 Å is	4 4	166 \$ 10.372	(3.5) (3.5)× (5 15 (B) 250.7eV	i potentiai wen	or length .
		*		31) (2.5)×10	41T1 2	Lu2
	(A) 150.7eV	8 mar	8 (4.1410	(B) 250.7eV	= 411	- 20 4 6.01
	(C) 350.7eV			(D) 450.7eV	24	n a 2 B = udms)
5	53. The potential of an el	ectron in a one	dimensional arr	angement of atoms	s is identical to the	hat used in the
,	Kronig-Penney mod	el. If Voab<< h	2/4л2m, the ener	rgy band gap at k=.	π/α is	P = KQ - HM
17.6	(A) $2V_0b/\alpha$	241	· G	(B) $2V_0 \alpha/b$	1/ 1/	1 2 13.46
335 4 44	(C) $V_0b/2a$		\	(D) $V_0 \alpha / 2b$	5	9
4141. 5	4. The susceptibility of a	piece of ferric	oxide is 1.5×10	0 ⁻³ . If the material	is subjected to a	magnetic field wi
- Name of the last	of 106 A/m, the flux	density in the m	naterial is	(D) LACOT	0	A
72710 X	(A) 0.259T			(B) 1.259T	0 =	4 HEATS
วังงาร	(C) 2.259T	2 40 5	B=1.	(D) 3.259T	21=1.5x	10
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1625	B 4 =	70			u = 74	- 11 4m
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55. The number of slip systems in an fcc crystal is	
(A) 4*	(B) 8
(C) 12 •	(D) 16
56. Reciprocal lattice of fcc lattice is	
	(D) 1
(A) fcc	(B) bcc (D) hexagonal
(C) sc	
57. L point in the first Brillouin Zone of an fcc lattic	ce has coordinates
(A) $2\pi/a(1,1,1)$	(B) $2\pi/a(1,0,0)$
(C) $2\pi/a(\frac{1}{2},0,0)$	(D) $2\pi/a(\frac{1}{2},\frac{1}{2},\frac{1}{2})$
58. In an intrinsic semiconductor, the Fermi level li	es la
•(A) at exactly center of band gap	
(B) approximately near center of band gap	
(C) inside valence band	
(D) inside conduction band	
59. In a degenerate semiconductor, Fermi level lies	
37. In a degenerate semiconductor, I crim level lies	
(A) at exactly center of band gap —	1 vas 1 cond
(B) approximately near center of band gap	· 1.4.
(C) inside valence or conduction band	
(D) 5kT away from valence or conduction be60. In case of thermal equilibrium in a semiconductor	or, if n, p, Nc, Nv and n be densities of electrons.
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction be intrinsic carriers respectively, then 	
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction be intrinsic carriers respectively, then 	or, if n, p, Nc, Nv and n _i be densities of electrons, band, effective density of states in valence band and NcN = MP
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction be intrinsic carriers respectively, then 	or, if n, p, Nc, Nv and n _i be densities of electrons, band, effective density of states in valence band and NcN _c = 4P
 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction hintrinsic carriers respectively, then (A) np = n_i² (C) np = NcNv - n_i² 	for, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_{\bullet} = 4P$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction be intrinsic carriers respectively, then 	or, if n, p, Nc, Nv and n _i be densities of electrons, band, effective density of states in valence band and NcN = NP (B) np = NcNv (D) np = n _i ² - NcNv peratures specific heat of solids varies with
 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction hintrinsic carriers respectively, then (A) np = n_i² (C) np = NcNv - n_i² 61. According to Einstein's model, at very low temp temperature T as (a is a positive constant) 	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i \subseteq MP$ (\overline{B}) np = NcNv (D) np = n_i^2 - NcNv peratures specific heat of solids varies with
 60. In case of thermal equilibrium in a semiconductor holes, effective density of states in conduction hintrinsic carriers respectively, then (A) np = n_i² (C) np = NcNv - n_i² 61. According to Einstein's model, at very low temp temperature T as (a is a positive constant) 	for, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_{\bullet} = nP$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with
 (A) T (B) 5kT away from valence or conduction be conducted to the conduction of the	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_0 = n_0$ $(B) \text{ np} = \text{NcNv}$ $(D) \text{ np} = n_i^2 - \text{NcNv}$ peratures specific heat of solids varies with $(B) T^2$ $(D) \exp(-a/T)$
 (a) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconduction holes, effective density of states in conduction hintrinsic carriers respectively, then (b) 10 mp = n₁² (c) 10 mp = NcNv - n₁² (d) 10 mp = NcNv - n₁² (e) 11 mp = n₁² (f) 12 mp = NcNv - n₁² (g) 13 mp = n₁² (h) 10 mp = NcNv - n₁² (h) 11 mp = n₁² (h) 12 mp = n	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_0 = n_0$ $(B) \text{ np} = \text{NcNv}$ $(D) \text{ np} = n_i^2 - \text{NcNv}$ peratures specific heat of solids varies with $(B) T^2$ $(D) \exp(-a/T)$
 (A) T (B) Taway from valence or conduction be conducted to the conduction of the co	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i = n_i$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ stribution of molecular velocities is (B) $\sqrt{(3kT/m)}$
 (a) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconduction holes, effective density of states in conduction hintrinsic carriers respectively, then (b) 10 mp = n₁² (c) 10 mp = NcNv - n₁² (d) 10 mp = NcNv - n₁² (e) 11 mp = n₁² (f) 12 mp = NcNv - n₁² (g) 13 mp = n₁² (h) 10 mp = NcNv - n₁² (h) 11 mp = n₁² (h) 12 mp = n	for, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N = nP$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ Attribution of molecular velocities is
 (A) T (B) Taway from valence or conduction be followed as the conduction of the con	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i \subseteq MP$ $\overline{(B)}$ np = NcNv (D) np = n_i^2 – NcNv peratures specific heat of solids varies with $\overline{(B)}$ T ² $\overline{(D)}$ exp(-a/T) Attribution of molecular velocities is $\overline{(B)}$ $\sqrt{(3kT/m)}$ $\overline{(D)}$ $\sqrt{(5kT/2m)}$
 (A) T (C) T³ √ (A) T (C) T³ √ (C) T³ √ (C) T³ √ (D) T³ √ (E) T³	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i \subseteq MP$ $\overline{(B)}$ np = NcNv (D) np = n_i^2 - NcNv peratures specific heat of solids varies with $\overline{(B)}$ T ² $\overline{(D)}$ exp(-a/T) Attribution of molecular velocities is $\overline{(B)}$ $\sqrt{(3kT/m)}$ $\overline{(D)}$ $\sqrt{(5kT/2m)}$
 (A) T (B) Taway from valence or conduction be followed as the conduction of the con	for, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in \mathbb{N}_0 \subseteq \mathbb{N}_0$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ Attribution of molecular velocities is (B) $\sqrt{(3kT/m)}$ (D) $\sqrt{(5kT/2m)}$
 (A) T (C) T³ √ 62. Most probable speed in Maxwell-Boltzmann distriction of the content of the con	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i = MP$ (\overline{B}) np = NcNv (D) np = n_i^2 - NcNv peratures specific heat of solids varies with (B) T^2 (D) exp(-a/T) Attribution of molecular velocities is (B) $\sqrt{(3kT/m)}$ (D) $\sqrt{(5kT/2m)}$ and gas at room temperature is (R is gas constant) (B) $5R/2$
 (A) T (C) T³ (B) Taway from valence or conduction be semiconduction to the intrinsic carriers respectively, then (A) np = n_i² (C) np = NcNv - n_i² (B) T (C) T³ (C) T³ (C) T³ (C) T³ (D) Naxwell-Boltzmann distribution of the intrinsic carriers respectively, then (A) T (C) T³ (B) T (C) T³ (C) T³ (D) √(2kT/m) (E) √(8kT/πm) (E) √(8kT/πm) (E) √(8kT/πm) (E) √(8kT/πm) (E) √(8kT/πm) (E) √(8kT/πm) 	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i = n_i$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ observatures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ stribution of molecular velocities is (B) $\sqrt{(3kT/m)}$ (D) $\sqrt{(5kT/2m)}$
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconduct holes, effective density of states in conduction holes, effectively, then (A) np = n₁²	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N = MP$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ Atribution of molecular velocities is (B) $\sqrt{(3kT/m)}$ (D) $\sqrt{(5kT/2m)}$ and gas at room temperature is (R is gas constant) (B) $5R/2$ (D) $9R/2$ The first part of the state of
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconduction holes, effective density of states in conduction holes, effectively, then (A) np = n₁²	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N_i = MP$ $(B) \text{ np} = \text{NcNv}$ $(D) \text{ np} = n_i^2 - \text{NcNv}$ peratures specific heat of solids varies with $(B) T^2$ $(D) \exp(-a/T)$ attribution of molecular velocities is $(B) \sqrt{(3kT/m)}$ $(D) \sqrt{(5kT/2m)}$ a gas at room temperature is (R is gas constant) $(B) 5R/2$ $(D) 9R/2$
 (D) 5kT away from valence or conduction be 60. In case of thermal equilibrium in a semiconduct holes, effective density of states in conduction holes, effectively, then (A) np = n₁²	or, if n, p, Nc, Nv and n_i be densities of electrons, band, effective density of states in valence band and $N \in N = MP$ (B) $np = NcNv$ (D) $np = n_i^2 - NcNv$ peratures specific heat of solids varies with (B) T^2 (D) $exp(-a/T)$ Atribution of molecular velocities is (B) $\sqrt{(3kT/m)}$ (D) $\sqrt{(5kT/2m)}$ and gas at room temperature is (R is gas constant) (B) $5R/2$ (D) $9R/2$ The first part of the state of

	64. In micro canonical en	semble		
to	(A) energy is fixed (C) both A & B	d	(B) no. of particles is fixed (D) none of A & B	
N	65. In Bose-Einstein cond	densation, transition temper	ature Tc is given by	
1	(A) $[h^2/(2\pi mk)][N]$ (C) $[h^2/(2\pi mk)][N]$		(B) $[h^2/(2\pi mk)][N/(2.612V)]^{-1}$ (D) $[h^2/(2\pi mk)][N/(2.612V)]^{-2}$	6 %
(66. In spectroscopic notar represented by		atom having angular momentum state	: l=3 is
		7=3		- 1
	(A) s	2421 2	(B) n	
	(C) d	7	(B) p (D) f •	
	67. Vibrational and rotati known as	onal motions of a molecule	are independent of each other. This p	rinciple is
	(A) Born-Oppenh	eimer approximation	(B) Raman effect	•
	(C) Stoke's law	enner approximation	(D) Larmor precession	L 3
			(b) Lumer precession	3
	68. Number of vibrationa	al degrees of freedom in N a	tom linear molecule is 3 °	1-3
	(4) 201 2	3 N=3	(D) 201 4	3
	(A) $3N - 3$	*	(B) $3N - 4$	
	\bullet (C) $3N-5$		(D) $3N - 6$	
	69. In order to be Raman	active a molecular rotation	or vibration must cause some change	in
	(A) electric dipole	e moment	(B) magnetic dipole moment	
	(C) electric quadr	upole moment	(D) molecular polarizability	
(70. Selection rule for Rar	nan spectroscopy is		
	$(A) \Delta J = 0$		(B) $\Delta J = \pm 2$	
	$(A) \Delta J = 0 \text{ or } \pm 2$		(D) $\Delta J = \pm 1$	
	71. If a mu-meson is capt to hydrogen atom wi		al, the radius of the mu-mesonic atom	
			(D) 2002 :	
	(A) 200 times		(B) 200 ² times	
	(C) 1/200 times		(D) $1/200^2$ times	
	72. Nuclear shape can be	determined from a measure	ement of	
	(A) nuclear electrical (C) nuclear magnetic	ic dipole moment etic dipole moment	(B) nuclear electric quadrupl (D) nuclear magnetic quadru	e moment ple moment
	72 Ground state of deute	ron is in which angular mor	mentum state	
			(B) combination of l=0 and l=	1
	(A) I=0		(D) combination of 1=0 and 1=	2
	(C) I=2	H n		2
			Ja(1+1) 5	
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83.

12	and '	
74. Ground state of deuteron is in which spin state	,,,	
	(B) $S = \frac{1}{2}$	
(A) S = 0	(D) $S = 2$	
\bullet (C) S = 1	(D) 3 – 2	
75. Which of the following particles is responsible for in the decay of neutron?	carrying away the missing e	energy and momentum A P + 5 A P + 5 A P + 5
		11 7 P + 1
(A) alpha particle Y	(B) neutrino	W
(C) lepton	(D) proton	n > 1 *
l forman appropriate forman in	UT	() P ?
6. An example of a non-conservative force is		~ >
(A) Gravitational force	(P) Floates static 6	
(C) Magnetostatic force	(B) Electrostatic force (D) Viscous force	
(C) Magnetostatio Torce	(D) Viscous force	٠٠٠٠٠
. Isotropy of space gives rise to conservation of	A Car	Same
i isotropy of open of Server is a control various of		·
(A) Linear momentum	(B) Angular momentu	m
(C) Energy	(D) Charge	•••
	(-,80	-
In a collision of two fundamental particles in a cen	iter of mass frame	
(A) Total energy of both particles is zero		
(B) Total linear momentum is zero	4	
(C) Total angular momentum is zero		
(D) Total charge is zero		
The negative result of Michelson-Morley experime	ent suggests that	
. The negative result of whenerson wierrey experime	5	
(A) Space is homogeneous		
TRy Light travels with a finite speed		
There is no special reference frame in the	universe -	
(D) There is a special reference frame in the un	niverse	
In Theory of Special Relativity, if space-time inter	rval $ds^2 = 0$ between two even	ents A & B, then
		di édi di
(A) Two events are simultaneous	ace	di cel
(B) Two events happen at the same point in sp	styleen points A & B	cairar
(C) It will take zero time for signal to travel be	stween points it as a	di cair
(D) Points are light like separated		
If 1 A current flows through a circuit, then the nur	mber of electrons flowing th	rough the circuit per
If I A current flows through a circuit, then the nur	moet of elections from g	rough the circuit per
second is		1= a ne
Property of the Comment of the Comme	(B) 1.6×10^{19}	+ +
7A) 0.625 x 10 ¹⁹	(D) 0.625 x 10 ⁻¹⁹	
(C) 1.6 x 10 ⁻¹⁹	(D) 0.023 X 10	t = ne
	V. V	
The resistivity of a conductor depends on	(B) Length of the co	nductor 4 C = 1
(A) Area of the conductor	(D) None of these	
(C) Type of material		
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	63. Kirchnoff's Current Law works on the principle of wh	hich of the following
	1	V (av → @ () (w → E
	(A) Law of conservation of charge	
	• (B) Law of conservation of energy	() E
	(C) Both	
	(D) None of the above	
	84 How much is the bess to series to the	
	84. How much is the base to emitter voltage of a transistor	or in the ON state
	(A) Zero	(D) 0.7 - V
	(C) 0.7 V	(B) 0.7 mV
	(C) 0.7 V	(D) Variable
	85. α and β are transistor parameters. If $\beta = 100$, then the	anneavimate value of a is
	os. a and p are transistor parameters. If p = 100, then the	approximate value of a is
	(A) 0.99	(B) 99
	•(C) 1.01	(D) 101
	(6) 1.01	(5) 101
	86. The 1's compliment of a binary number is obtained b	ov changing
	the second secon	2
	(A) Each '1' to a '0'	(B) Each '0' to a '1'
	(C) Each '1' to a '0' and each '0' to a '1'	(D) None of the above
	(-)	
	87. A decimal number 6 in excess - 3 code is written as	1.01 10- 5.
	1+1	ما موات ا
	● (A) 0110	(B) 0011
	(C) 1101	(D) 1001
		1 101
	88. The output of a 10 input OR gate is high	+ 10-
w/	(A) only if even number of inputs are high	
7/2	(B) only if odd number of inputs are high	
X/	(C) if any one input is high	
141	(D) if any one input is low	
	X \	l flaath and buto is
1	89. The equivalent decimal number of a maximum bina	ry number of length one byte is
		'(D) 64
	(A) 8	(B) 64 (D) 256
	(C) 255	(D) 256
		PA CHARLETT
	90. The parity of the binary number 100110011 is	31 / 54
		(B) odd
	(A) even	(B) 6dd (D) 5
	(C) 4	(D) 3
		earth is approximately 1 m. The approximate
	91. The length of second's pendulum on the surface of length of same pendulum on the surface of moon,	where apploximately 1 in. The approximate
	length of same pendulum on the surface of moon,	where acceleration due to gravity is (170)th of the g
	on the surface of earth is	
	Ch and	
	(A) 36 m	(B) 1 m
	(C) 1/36 m	●(D) 1/6 m
	(C) 1/30	et. atil
		201 _1 = 19
		9 1 2017
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	VIL JVI. SC I II J S. C.	

	5146	y = A 59	nw+ 13 (
1	64- 34-	J	
	3/2 simple he	mm on!	
92. The displacement of	particle performing simple ha	amonic motion is give	n by, x = 8 sin(wt) + 6
cos(wt), where distar	nce is in cm and time is in sec	ond. The amplitude of	f motion is
		(D)	(ALT
(A) 10 cm		(B) 14 cm	64 5-22 5 cos "1
(C) 2 cm		(D) 4 cm	ind 36 + 2/3
93. A simple pendulum is	set up in a trolley which mo	ves to the right with ar	acceleration "a" on a
horizontal plane. The	if the thread of the pendulum	in the mean position r	nakes an angle a with the
vertical where q is given	ven by		an angle q with the
a .	4		
(A) $tan^{-1}(a/g)$ in the	e forward direction	\bullet (B) $tan^{-1}(a/g)$ in t	he backward direction
(C) tan (g/a) in the	e forward direction	(D) $tan^{-1}(g/a)$ in t	he backward direction
		(8 -)	are ouckward direction
94. A particle executes Sir	mple Harmonic Motion (SHN	M) of amplitude "A"	At what distance from maan
position its kinetic end	ergy is equal to its potential	energy	plant, if
	1.		4 KEEPIE
(A) 0.51 A	Sin 15	(B) 0.61 A	
(C) 0.71 A*	sin 45)	(D) 0.81 A	
8(2)	1.7		
95. A second's pendulum i	s placed in space laboratory	Orbiting around 41	
Farth's surface where	R is Earth's radius. The time	period of the	rth at a height 3R from
Eurin 5 Surries vinore	it is built studies. The time	e period of the pendulu	m will be
(A) Zero		(D) le	
(C) 3 s		(B) $\sqrt{3}$ s • (D) Infinite	7 = 211
(C) 3 \$		(D) Infinite	+
Of The south love of the own			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
96. The zeroth law of therm	nodynamics allows us to def	ine	1 1 45-1
		9c	07 865-1 -
(A) work		(B) internal energ	gy
७ (C) temperature		(D) entropy	
97. A constant-volume gas	thermometer is used to mea	sure the temperature o	f an object. When the
thermometer is in conta	act with water at its triple po	oint (273.16 K) the pre	ssure in the thermometer is
8.500×10^4 Pa. When i	t is in contact with the object	ct the pressure is 9.650	0×10^4 Pa. The temperature
of the object is	a S		
and coject is	6-00 c 6-		P = 96 x293
(A) 37.0 K	P1 = 42	(D) 241 V	4.3, 420
	~ · ·	(B) 241 K	9 9.6 4
•(C) 310 K		(D) 314 K	- 10
00 77			[] 4 d.p.
98. The two metallic strips t	hat constitute a thermostat i	nust differ in	4-5410 = 4. B
2	A = 80.	· v ⁶	4.5*
(A) length	1.5 4 6 6.65	(B) thickness	
*/o (C) mass	1/27.	(D) coefficient of	linear expansion
13	2*	(=)	
99. The coefficient of expans		0012 per Co The coef	ficient of volume expansion.
33. The coefficient of expans	sion of certain steel is u.uu	0.12 per C . The coci	notice of volume dispersions,
in $(C^{\circ})^{-1}$, is	V = Vo(1-	JT)	<- ·
1	V = Vo(1-	()	1003 P251
(A) (0.000012))12)
(A) $(0.000012)^3$ (C) 3×0.000012	400	(D) 0.000012	x 2 4 0 3
eminer in the second se			M 921
100. Heat from Sun reaches	the Earth by	+11	**
100. Heat from Suil leaches	and Later by	(B) Conduction	6 2+1
(A) Radiation	117/12	(B) Conduction (D) None of the a	hove Well
(B) Convection	3	(D) None of the a	* L. F & S
	133	0	2017
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14120 141.001.11	ay / 3	b 1.2x	(0 xx 4.7.4.