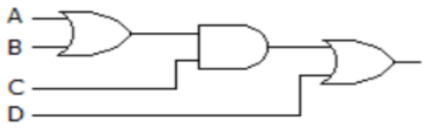
M.Sc. Physics

Q. No.	Question	Option A	Option B	Option C	Option D
1	Which of the following options represent the synchronous control inputs in an S-R flip flop?	S	R	Clock	Both S and R
2	The result X + XY = X follows which of these laws?	Consensus law	Distributive law	Duality law	Absorption law
3	De Morgan's theorem states that _____	(AB)' = A' + B'	(A + B)' = A' * B	A' + B' = A'B'	(AB)' = A' + B
4	**The Boolean expression for the logic circuit shown below is:** 	CA+CB+CD	$C(A+B)^{-}D$	C(A+B)+D	None of the above
5	The maximum efficiency of a half wave rectifier is	40.60%	60.6 %	80.6 %	None of the above
6	In a common emitter amplifier, the phase difference between the input signal voltage and the output voltage is	0°	45°	90°	180°
7	The lattice parameters for a tetragonal structure are	$a= b \neq c, \alpha = \beta = \gamma = 90°$	$a = b = c, \alpha = \beta = \gamma = 90°$	$a \neq b \neq c, \alpha = \beta = \gamma = 90°$	$a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90°$

8	The Fermi level for an intrinsic n type semiconductor	Lies mid-way between the valence and conduction band	Lies near the conduction band	Lies near the valence band	Does not exist
9	The temperature at which ferromagnetic material changes to paramagnetic material is known as	Neel temperature	Curie temperature	Transition temperature	none of the above
10	X-rays of 173 nm wavelength are reflected by the (111) plane of a cubic primitive crystal at $\theta = 30^0$. The unit cell length (approximately) is	100 nm	200 nm	300 nm	400 nm
11	Which type of semiconductor is obtained by doping Si with Bi?	p-type	n- type	n-p-n type	p-n-p type
12	A red LED emits light at 0.1 watt uniformly around it. The amplitude of the electric field of the light at a distance of 1 m from the diode is:	1.73 V/m	2.45 V/m	5.48 V/m	7.75 V/m
13	The vector direction normal to the plane (110) is:	[001]	[010]	[100]	[110]
14	The one-dimensional monoatomic lattice acts as	By-pass filter	High-pass filter	No-pass filter	Low-pass filter
15	Debye T^3 law is valid at	Very low temperatures	Very high temperatures	All values of temperature	None of the above

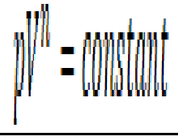
16	Superconducting transition temperature for mercury (Hg) is	4.15^0C	4.15 K	273 K	0^0C
17	The transition temperature of mercury with an average atomic mass of 200.59 amu is 4.153 K. The transition temperature of one of its isotopes, 80Hg204 is	4K	4.1K	4.3K	4.5K
18	The depletion layer in the p-n junction region is caused by	Diffusion of carriers	Drift of electrons	Drift of holes	Migration of impurity ions
20	A charge Q is placed at the mid point of the line joining two similar positive equal charges q and q. The charges q will be in equilibrium if Q is equal to	-q	q/4	-q/4	q
21	An electric bulb is rated 220 V and 100 W. Power consumed by it when operated on 110 V is	50 W	75 W	90 W	25 W
22	If the position of given charges inside the Gaussian surface is changed such that the total charge remains constant, then the normal electric flux through the Gaussian surface	increases	decreases	remains uncharged	none of the above
	Lissajous figures are formed when a point is made to execute two simple harmonic motions in a plane which are	Parallel to one another	Perpendicular to one another	Opposite to each other	None of these
23	At resonance the oscillations always lag behind the force by	0	$\pi/2$	π	2π

24	In a stationary wave the distance between a node and nearest antinode is	λ/4	λ/2	λ	2 λ
25	Two light waves of wavelengths λ_1 and λ_2 become incident simultaneously on double slits in Young's double experiment. If third bright fringe of wavelength λ_1 meets fourth bright fringe of wavelength λ_2, then	$\lambda_1 = 3\lambda_2$	$\lambda_2 = 3\lambda_1$	$3\lambda_1 = 4\lambda_2$	$4\lambda_1 = 3\lambda_2$
26	In Michelson interferometer when sodium light is used, the movable mirror is to be moved through a distance of x metre for two successive positions of maximum distinct, then the separation between two close wavelengths will be	$\lambda^2/2x$	$\lambda^2/4x$	$\lambda^2 .2x$	$2x/\lambda^2$
27	In Newton's ring arrangement with air film in reflected light, the diameter of *nth* fringe is $\mathbf{D_n}$. If the air film is replaced by a liquid film of refractive index **μ**, the diameter of *nth* fringe will become	$\mu^{½}$ times	$1/\mu^{½}$ times	1/μ times	μ times
28	In wedge shaped film the interference pattern has nature	Parallel to the end where thickness is non-zero	Perpendicular to contact edge	Perpendicular to the end where thickness is non-zero	Parallel to contact edge
29	A charged particle of charge q moving with velocity v enters along the axis of a current carrying solenoid. The magnetic force on the particle is	0	qvB	finite but not qvB	Infinite
30	A wire of length L carrying current i is placed perpendicular to the magnetic induction B. The total force on the wire is	iLB	iB/L	iL/B	LB/i
31	The ratio of the magnetization $\bar{I}$ to the magnetic field intensity $\bar{H}$ is called	Magnetic permeability	Magnetic Susceptibility	Coercivity	Retentivity

32	How many ways 3 particles can be distributed in 4 energy states a, b, c and d according to F-D statistics	64	20	4	3
33	If the equation of state for a gas with internal energy U is pV=1/3U, then the equation for an adiabatic process is	$pV^{1/3}$ = constant	$pV^{2/3}$ = constant	pV4/3 = constant $p = \frac{3U}{5V}$	$pV^{3/5}$ = constant
34	The pressure for a non-interacting Fermi gas with internal energy U at temperature T is	$\boldsymbol{p = \frac{3U}{2V}}$	$\boldsymbol{p = \frac{2U}{3V}}$		$\boldsymbol{p = \frac{1U}{2V}}$
35	Stirling's formula for large n is	log n! = n log n	log n! = n log n – n	log 2n! = 2 log n – n	log n! = n log n + n
36	Bosons have a spin value:	Zero	½	1	0 or 1
37	Which of the following statements with reference to nuclear forces is not true?	Short range	Charge independent	Strongest force	Spin independent
38	How many degree's of freedom a rigid body possess-	3	6	9	Infinite
39	In complex analysis, a pole of a function refers to:	A point where the function is not defined	A point where the function is continuous	A singularity of the function where it becomes infinite	A point where the function has a local maximum or minimum

40	If A=-A', then A will be…	Symmetric	Skew symmetric	Hermitian	Skew Hermitian
41	The equation $x^2+ 3xy+ 2y^2+2x + 3y+1=0$ represents ..	An ellipse	A parabola	A hyperbola	A pair of straight line
42	The latus rectum of the ellipse $5x^2+ 9y^2=45$ is	5/3	10/3	$2\sqrt{5}/3$	$\sqrt{5}/3$
43	The eigen value of a matrix A are 1, -2, 3. Eigen values of $3I-2A+ A^2$	2, 11, 6	3, 11, 8	2, 3, 6	6, 3, 11
44	The value of the Integral $\int_C \frac{(3z+1)\,dz}{z(2z+1)}$; where C is the circle $\|z\|=1$ is	3πi	4	-4	-2πi
45	The Residue of $\frac{z^3}{z^4-1}$ at z= ∞ is	1	-1	0	∞
46	The probability of solving a problem by three students A, B, C independently are 1/3, 1/4 1/5 . The probability that the problem will be solved is.	1/60	36/60	48/60	57/60
47	The direction of grad ϕ is	Tangential to level surface	Normal to level surface	Inclined at 45^0 to level surface	Arbitrary

48	If $\vec{r}$ is a position vector, then curl $\vec{r}$ is:	0	3	r^{-2}	$r^{3/2}$
49	Magnetic Vector potential due to magnetic dipole is proportional to	r	r^{-1}	r^{-2}	r^{-3}
50	The ratio of electric field vector E and magnetic field vector H has the dimensions of	Resistance	Inductance	Capacitance	Product of inductance and capacitance
51	The cut-off wavelength λc for TE_{20} mode for a standard rectangular waveguide is……..	2/a	2a	a	$2a^2$
52	A plane electromagnetic wave in free space is specified by the electric field a V/m. The associated magnetic field is ---	$\frac{a_y}{120\Pi}[20\cos(\omega t-\beta z)+5\cos(\omega t+\beta z)]$ A/m	$\frac{a_y}{120\Pi}[20\cos(\omega t-\beta z)-\cos(\omega t+\beta z)]$ A/m	$\frac{a_y}{120\Pi}[20\cos(\omega t-\beta z)+5\mathrm{Sin}(\omega t+\beta z)]$ A/m	$\frac{a_y}{120\Pi}[20\cos(\omega t-\beta z)+5\cos(\omega t+\beta z)]$ A/m
53	When angle of incidence is greater than Brewster's angle, the reflected ray suffers a phase change of	π	π/2	0	2bπ
54	Which is the incorrect statement about the e. m. wave?	The electromagnetic field vectors $\vec{E}$ and $\vec{B}$ are mutually perpendicular and they are also perpendicular to the direction of propagation of EM wave	The field vectors E and(B) are in same phase	The field vectors E and(B) are along the same direction.	Electromagnetic waves are transverse in nature
55	A conducting sphere of radius r has charge +Q on its surface. If the charge on the sphere is doubled and its radius is halved, the energy associated with the electric field will	Increase four times	Increase eight times	Remains the same	Decrease four times

56	A rod of proper length 100 cm start moving with velocity 0.8 c. The length of the rod in motion is	80 cm	60 cm	36 cm	None of these
57	The law of gravitation gives the gravitational force between	Any two bodies having some mass	The earth and the sun only	The earth and the point mass only	None of these
59	What type of waves are light wave	Transverse wave	Longitudinal wave	Both transverse and longitudinal	None of the above
60	A Bose-Einstein gas has two particles in the *i* -th state whose degeneracy is three. Find the number of independent ways of selecting the particles in the state.	3	9	6	4
61	For a Fermi-Dirac gas, the number of ways of putting ni particles in gi level in the *i* -th state	$W_i = \frac{g_i!}{n_i!\,(g_i - n_i)!}$	$W_i = \frac{g_i!}{n_i!\,(g_i + n_i)!}$	$W_i = \frac{(n_i + g_i)!}{n_i!\,g_i!}$	$W_i = \frac{n_i!}{n_i!\,(g_i! - n_i!)}$
62	Mathematical expression for Van der Waal's model of real gases	$\left(P - \frac{a}{V^2}\right)(V + b) = RT$	$\left(P + \frac{a}{V^2}\right)(V - b) = RT$	$\left(P + \frac{b}{V^2}\right)(V - a) = RT$	$\left(P - \frac{a}{V^2}\right)(V + b) = RT$
63	In the equation of polytropic process , for an ideal gas, the process is isothermal, when 	$n = 0$	$n = 1$	$n = \infty$	None of these
64	The expression for the most probable distribution for Fermi-Dirac statistics is	$n_i = \frac{g_i}{e^{\alpha+\beta\epsilon_i} + 1}$	$n_i = \frac{g_i}{e^{\alpha+\beta\epsilon_i} - 1}$	$n_i = \frac{g_i}{e^{\alpha+\beta\epsilon_i}}$	None of the above

65	According to the Fermi-Dirac statistics the number of particles in a phase cell can be	Any number	Only one	Only three	Only two
66	Mayer's relation for an ideal gas	$C_P + C_v = R$	$C_P - C_v = R$	$C_v - C_p = R$	$\frac{C_P}{C_V} = R$
67	Equation for an adiabatic transformation of an ideal gas	$PV = R$	$PV^{\gamma} = constant$	$\frac{C_P}{C_V} = \gamma$	None of the above
68	For a harmonic oscillator, the zero-point energy is	$\hbar\omega$	$\frac{\hbar\omega}{2}$	0	$\frac{3\hbar\omega}{2}$
69	The moment of inertia of a body does not depend on its	Shape	mass	Axis of rotation	Angular velocity
70	Bohrs quantum condition is	$L = \frac{nh}{2\pi}$	$L = \frac{2nh}{\pi}$	$L = \frac{nh}{\pi}$	$L = \frac{\pi h}{2n}$
71	The Lagrangian 'L' of the system is given by	L=T+V	L=T-V	L=2T+V	L=T-2V
72	The degeneracy of the state having energy 27h2/8mL2 for a particle in a 3-D cubic box of length L is	four	three	two	one

73	At resonance the phase difference in velocity and driving force is always	0	$\pi/2$	π	2π
74	The distance between two successive nodal points in a stationary wave is	$\lambda/4$	$\lambda/2$	λ	2λ
75	In a Young's double slit experiment the distance between slits is 1mm and the distance of screen from slits is 1 m. If the width of 10 fringes on the screen is 0.6cm, then the wavelength of light is	6000Å	4000 Å	1200 Å	2400 Å
76	In Newton's rings experiment, the diameter of third and ninth rings are 0.3cm and 0.5cm respectively. The diameter of the 15th ring is	D_{15} = 0.64m	D_{15} = 0.90m	D_{15} = 0.02m	D_{15} = 0.46m
77	In Michelson interferometer, when movable mirror M1 is shifted by a distance 0.030mm, a fringe shift of 100 fringes is observed. Calculate the wavelength of the used	9000 Å	2000 Å	6000 Å	4000 Å
78	The virtual coherent sources are produced by	Division of amplitude	Division of wave front	Both (a) and (b)	None of these
79	In the Fraunhofer single slit diffraction the light wave front incident on the slit is	plane	spherical	cylindrical	elliptical
80	In diffraction of white light, which color show maximum bending	violet	blue	green	red

81	In wedge shaped film the interference pattern has nature	Cyclotron	Van de Graaff generator	Betatron	Tandem Van de Graaff generator
82	Complete the sequence of magic numbers as, 2, 8, 20, 50, ……,126, 184.	60	72	82	100
83	Silicon Atomic number 14 has two electrons in the unfilled 3P Shell according to hunds rule the ground state of Si is	1P1	3S1	3D3	3D1
84	A current amplifier is characterised by	low input impedance and high output impedance	high input impedance and low output impedance	low impedance at both input and output termial	high impedance at both input and out put terminal
85	The compton effect experiment photon of energy hv around material of atomic number z. The change in wavelength can be	frequency is in visible region and z is small	frequency is in X-ray region and z is small	frequency is in x-Ray region and z is large	None of these
86	For diamagnetic substance, the value of relative permeability is	μr >1	$\mu_r < 1$	$\mu_r >> 1$	$\mu_r = 1$
87	Measure of the magnetic flux remaining in the specimen when the magnetic force is removed is called	Coercivity	Retentivity	Hysterisis	None of these
88	Two parallel wires each 0.5m long are at a distance 1m from each other. If the current flowing through each wire is 1 amp. The force between the wires is	10^{-7} N	0.5 N	10^{7} N	5×10^{12} N

89	Number of ways of distributing 6 indistinguishable particles in 4 phase cells is	84	4	90	102
90	In an amplifier with negative feedback, the bandwidth is: (where A= gain of the aplifier and ß= feedback factor	increased by the factor of β	decreased by the factor of β	increased by the factor of (1+Aβ)	not affected at all by the feedback
91	Which of the following semiconductor is mostly used to construct electronic circuits?	Silicon (Si)	Germanium (Ge)	Selenium (Se)	Tin (Sn)
92	In superconductors, the Fermi energy level is	Below the ground state	Midway between the ground state and first excited state	Above first excited state	At first excited state
93	The piezoelectric materials used for converting energy are called as	Transition Devices	Converter	Dielectric	Transducer
94	What increases the resistance of wire at high frequencies	Temperature	Voltage	Skin Effect	Insulation
95	The force between two charges is 200 N. If the distance between the charges are doubled, the force will be	400 N	200 N	100 N	50 N
96	Sommerfield’s quantum theory obeys	MB statistics	BE statistics	F D statistics	None of the above

97	When the value of energy or αa is increased, then the width of allowed energy band	Increases	decreases	Remains constant	Become zero
98	When the current in a coil change from, 2A to 4A in 0.05 sec, an emf of 8V is induced in the coil. The coefficient of the self-induction of the coil is	0.1 H	0.2 H	0.4 H	0.8 H
99	Lenz’s law is a consequence of the law of conservation of	charge	momentum	energy	None of these
100	To shield an instrument from an external magnetic field it may be placed in a cabinet made of	Wood	Ebonite	Metal	Diamagnetic substance