Pune Institute of Computer Technology, Pune -43				
First Year Engineering Department				**Roll No:**
A.Y. 2020–21] Prelim Exam [Semester 1				
Subject: Engineering Physics				
Class: FE		Div.:	FE1 to FE5 & FE11	Date: 27/04/2021
Max. Marks: 60		**Paper:**	**Prelim Exam**	**Time: 9.00 am to 10 am**

Instructions:	1 There are 60 MCQ's, correct 50 will be considered. 2. Duration of exam is 60 minutes. 3. Submit the exam before due time. 4. You should put your video on during the examination. 5. Assume suitable data if necessary. 6. Figures to the right indicate full marks.

Q1	The condition for Darkness in reflected system for a film of uniform thickness is	CO1	1
a)	$2\mu t\cos r=(2n\pm1)\lambda/2$		
b)	$2\mu t\cos r=(2n\pm1)\lambda$		
c)	$2\mu t i\cos r=n\lambda$		
d)	$2\mu t\cos r=n\lambda$	D	
	Ans: D		
Q2	Condition of constructive interference is	CO1	1
a)	Path difference is odd multiple of $\lambda/2$		
b)	Path difference is even multiple of $\lambda/2$	B	
c)	Path difference is integral multiple of $\lambda/2$		
d)	None of these		
	Ans: B		
Q3	Which of the following does not support the wave nature of light?	CO1	1
a)	Interference		
b)	Polarization		
c)	Compton effect	C	
d)	Diffraction		
	Ans: C		
Q4	Choose the correct statement.	CO1	1
a)	In interference pattern all maxima are having equal intensity	A	
b)	In interference pattern, maxima are having decreasing intensity from the center.		
c)	In interference pattern maxima are having increasing intensity from the center		
d)	None of these		
	Ans: A		
Q5	Fringes of equal thickness are observed in thin glass wedge of refractive index 1.52. the fringe spacing is 1mm and the wavelength of light is 5893A.U . Calculate the angle of wedge in seconds of an arc	CO1	1
a)	20 sec		

b)	40 sec	B	
c)	80 sec		
d)	60 sec		
	Ans: B		
Q6	In the diffraction pattern due to a single slit, the width of the central maxima.....	CO1	1
a)	With red light is less than with violet light		
b)	With red light is more than with violet light	B	
c)	With red light is equal to with violet light		
d)	None of these		
	Ans: B		
Q7	In plane diffraction grating, the width of principal maximum....	CO1	1
a)	Increases as the number of slits increases.		
b)	Decreases as the number of slits increases.	B	
c)	Remains constant as the number of slits increases.		
d)	None of these		
	Ans: B		
Q8	When light diffracted from single slit the expression for resultant Intensity at point P (lying in the geometrical shadow region) will be given by the expression	CO1	1
a)	$I_\theta = I_m (\sin \alpha / N\alpha)$		
b)	$I_\theta = I_m (\sin \alpha / \alpha)^2$	B	
c)	$I_\theta = I_m (\sin N\alpha / \alpha)$		
d)	$I_\theta = I_m (\sin \alpha / \alpha)$		
	Ans: B		
Q9	In plane diffraction grating, the angle of diffraction is …..	CO1	1
a)	Directly proportional to wavelength	A	
b)	Inversely proportional to wavelength		
c)	Directly proportional to square root of wavelength		
d)	Inversely proportional to square root of wavelength		
	Ans: B		
Q10	A plane transmission grating has 5000 lines /cm. Find out the highest order of spectrum observed if incident light has λ=6000AU	CO1	1
a)	2		
b)	3	B	
c)	4		
d)	5		
	Ans: B		
Q11	On rotating the analyzer, the intensity of emergent light does not vary then the light incident on analyzer is:	CO1	1
a)	Plane polarized.		
b)	Elliptically polarized.		
c)	Unpolarized	C	

d)	Partially polarized.		
	Ans: C		
Q12	In a doubly refracting negative crystal, perpendicular to the optic axis:	CO1	1
a)	$\mu_o < \mu_e$		
b)	$\mu_o > \mu_e$	B	
c)	$\mu_o = \mu_e$		
d)	$\mu_o = \mu^2_e$		
	Ans: B		
Q13	Glass and water have refractive index 1.54 and 1.33 respectively. Which of the following will have maximum polarizing angle?	CO1	1
a)	Air Glass interface	A	
b)	Air water interface		
c)	Glass water interface		
d)	Water Glass interface		
	Ans: A		
Q14	Polarization phenomenon is useful in analyzing.	CO1	1
a)	Transverse nature of wave	A	
b)	Longitudinal nature of wave		
c)	Parallel nature of wave		
d)	Perpendicular nature of wave		
	Ans: A		
Q15	An unpolarized light of intensity A^2 passes through a polaroid. The intensity of emergent plane polarized light is:	CO1	1
a)	A^2		
b)	A		
c)	$\sqrt{A^2}$		
d)	½ A^2	D	
	Ans: D		
Q16	In case of population inversion	CO2	1
a)	N1 > N2		
b)	N1 < N2		
c)	N1=N2		
d)	None		
	Ans: B		
Q17	In spontaneous emission, an electron returns to the ground level due to	CO2	1
a)	Electric field		
b)	As per rules		
c)	Photo stimulation		
d)	Natural process		
	Ans: d		

Q18	Pumping process used in diode laser is.	CO2	1
a)	Optical pumping		
b)	Forward bias pumping		
c)	Electric discharge pumping		
d)	none		
	Ans: b		
Q19	Which of the following is not a laser property?	CO2	1
a)	Highly Monochromatic		
b)	Highly Directional		
c)	Highly Intense		
d)	Highly Divergent		
	Ans: d		
Q20	CO_2 laser produces laser light in the	CO2	1
a)	visible region		
b)	infra-red region		
c)	Ultraviolet region		
d)	Microwave region		
	Ans: b		
Q21	The purpose of the optical resonator in a laser is	CO2	1
a)	to make it monochromatic		
b)	to enhance energy density of radiation		
c)	to achieve population inversion		
d)	None of these		
	Ans: b		
Q22	While reconstructing the hologram acts as a	CO2	1
a)	Grating		
b)	Slit		
c)	Photographic plate		
d)	none		
	Ans: a		
Q23	The lasing action is possible only if there is	CO2	1
a)	Population inversion		
b)	A black body		
c)	Oscillation of laser sources		
d)	A set of reflecting mirrors		
	Ans: a		
Q24	Which of the following laser system is more efficient?	CO2	1
a)	Three level laser system		
b)	Both two level and three level laser system		
c)	Four level laser system		

d)	Two level laser system		
	Ans: c		
Q25	A ray of light will undergo total internal reflection if it	CO2	1
a)	Goes from rarer medium to denser medium.		
b)	Incident at an angle less than the critical angle		
c)	Strikes the interface normally.		
d)	Incident angle greater than the critical angle		
	Ans: d		
Q26	If the numerical aperture of an optical fibre is 0.296, find the acceptance angle.	CO2	1
a)	17^0. 24^1		
b)	18^0		
c)	60^0		
d)	90^0		
	Ans: A		
Q27	Refractive index of the core and cladding is 1.48 & 1.45 in an optical fiber, then its numerical aperture is	CO2	1
a)	0.2964		
b)	0.45		
c)	0.692		
d)	2.9		
	Ans: a		
Q28	The ratio of the optical output power from a fiber of length 'L' to the input optical power is	CO2	1
a)	Gain of signal		
b)	Acceptance angle		
c)	Attenuation		
d)	None of these		
	Ans: C		
Q29	Advantages of fiber optics communication are	CO2	1
a)	No interference of external source like RF, EMW		
b)	Safe and secure communication		
c)	Large band width		
d)	All the above		
	Ans: d		
Q30	Calculate the critical angle between two materials with indices of n1=1.45 and n2 = 1.40	CO2	1
a)	50^0		
b)	75^0		
c)	0^0		
d)	25^0		
	Ans: b		
Q31	The energy of particle trapped in an infinite potential well is proportional to	CO3	1

a)	n^2		
b)	n^{-2}		
c)	n		
d)	n^{-1}		
	Ans: a		
Q32	For the particle in the box, the potential is maximum at x=	CO3	1
a)	L/2		
b)	2L		
c)	L		
d)	L/3		
	Ans: c		
Q33	Wave-particle duality is not perceived in the classical world due to	CO3	1
a)	Large wavelength associated		
b)	Small value of Planck's constant		
c)	Small momentum associated		
d)	Small mass associated		
	Ans: b		
Q34	Which of the following is not a pair of conjugate physical quantities according to the Heisenberg Uncertainty Principle?		
a)	Energy-time	CO3	1
b)	Position-momentum		
c)	Angular momentum-Angular displacement		
d)	Energy-momentum		
	Ans: d		
Q35	The energy of quantum particle, E =		
a)	$\hbar$ k	CO3	1
b)	$\hbar$ ω		
c)	$\hbar$ ω/2		
d)	$\hbar$ k/2		
	Ans: b		
Q36	Tunneling is observed in	CO3	1
a)	Beta Particles		
b)	X-rays		
c)	Alpha Particles		
d)	Gamma rays		
	Ans: c		
Q37	Tunnel diode consists of	CO3	1
a)	Highly doped p & n-region		
b)	Lightly doped p-region		
c)	Lightly doped p & n-region		

d)	Highly doped p-region		
	Ans: a		
Q38	Which of the following is the correct Schrodinger time dependent equation?	CO3	1
a)	$E\psi = \frac{-i\hbar}{2m}\frac{\partial^2\psi}{\partial x^2} + U\psi$		
b)	$i\hbar\frac{d\psi}{dt} = \frac{-i\hbar}{2m}\frac{\partial\psi}{\partial x} + U\psi$		
c)	$E\psi = \frac{-i\hbar}{2m}\frac{\partial\psi}{\partial x} + U\psi$		
d)	$i\hbar\frac{d\psi}{dt} = \frac{-i\hbar}{2m}\frac{\partial^2\psi}{\partial x^2} + U\psi$		
	Ans: d		
Q39	An electron beam is accelerated from rest by the potential difference of 200V. Calculate the associated de-Broglie wavelength	CO3	1
a)	0.68 nm		
b)	0.086 nm		
c)	0.86 nm		
d)	0.068 nm		
	Ans: b		
Q40	Calculate the wavelength of a photon having energy 1 eV.	CO3	1
a)	12431 Angstrom		
b)	12.26 Angstrom		
c)	12000 Angstrom		
d)	1.226 Angstrom		
	Ans: a		
Q41	Packet of energy is -------	CO3	1
a)	Photon		
b)	Phonon		
c)	Quanta		
d)	Plasmon		
	Ans: c		
Q42	The de-Broglie wavelength of moving tennis ball is calculated as 1.5×10^{-33} m. This means that the moving tennis ball	CO3	1
a)	diffracts through a narrow slit		
b)	is travelling at the speed of light		
c)	doesn't behave as a particle		
d)	doesn't display wave property		
	Ans: d		
Q43	Ground state energy of an electron trapped in infinite potential well of width 1 Å is	CO3	1
a)	3.8 eV		
b)	38 eV		
c)	8.3 eV		

d)	83 eV		
	Ans: b	CO3	1
Q44	Which of the following is not a characteristic of wave function?		
a)	Continuous		
b)	Single valued		
c)	Differentiable		
d)	Physically significant		
	Ans: d		
Q45	How does a scanning tunnelling microscope map a surface?	CO3	1
a)	by measuring the current due to tunnelling electrons		
b)	by measuring the voltage created by electron transfer		
c)	by measuring the size of each individual electron		
d)	by measuring the size of each atom of the surface		
	Ans: a		
Q46	Band theory of solids is true for	CO4	1
a)	Solids		
b)	Liquids		
c)	Solids and liquids		
d)	Gases		
	Ans (a)		
Q47	Much above 0 degree Kelvin the valence band	CO4	1
a)	Filled		
b)	Empty		
c)	Partially filled		
d)	50% filled		
	Ans (d)		
Q48	Fermi level for a metal is the highest occupied energy level by the electrons at	CO4	1
a)	0 degree Celsius		
b)	0 degree Fahrenheit		
c)	0 degree Kelvin		
d)	Above 0 degree Kelvin		
	Ans (c)		
Q49	If we add impurity to a metal its resistivity will	CO4	1
a)	Increase		
b)	Decrease		
c)	Remains same		
d)	Difficult to predict		
	Ans (a)		
Q50	For p-type Semiconductor Fermi level lies	CO4	1
a)	Below conduction band		

b)	Above valence band		
c)	Middle of the energy gap		
d)	Above conduction band		
	Ans (b)		
Q51	Fill Factor of the good quality Solar cell must be	CO4	1
a)	Equal to1		
b)	More than 1		
c)	Less than 1		
d)	Close to 1		
	Ans (d)		
Q52	Under similar conditions Maximum Hall voltage developed in	CO4	1
a)	Metal		
b)	Semiconductor		
c)	Metal and Semiconductor both		
d)	Insulator		
	Ans (a)		
Q53	Hall Coefficient of a specimen of a semiconductor found to be 3.66 X 10E-4 cubic meter per coulomb. The resistivity of the specimen is 8.93 X10E-3 ohm-m. Its mobility would be	CO4	1
a)	0.05		
b)	0.04		
c)	0.03		
d)	0.02		
	Ans (b)		
Q54	A semiconductor is transparent to radiation of wavelength above 11000 Angstrom determine the name of the Semiconductor	CO4	1
a)	Ge		
b)	Si		
c)	GaAs		
d)	GaP		
	Ans (b)		
Q55	In solar cell maximum voltage is developed when	CO4	1
a)	Load resistance is minimum		
b)	Load resistance is maximum		
c)	Current is maximum		
d)	Intensity of light is maximum.		
	Ans (b)		
Q56	When p-n Junction diode is under forward bias, type of current flows	CO4	1
a)	Diffusion		
b)	Drift		
c)	Drift and Diffusion both		

d)	Surface current		
	Ans (b)		
Q57	Forbidden energy gap contains electrons that	CO4	1
a)	Belongs to innermost orbits of atoms		
b)	Belongs to conduction band		
c)	Belongs to Valence band		
d)	It contains no electrons		
	Ans (d)		
Q58	Efficiency of solar cell defined as	CO4	1
a)	Real power / Ideal power		
b)	Input power / output power		
c)	Max. Current X Max. voltage / Light power input		
d)	Current X Voltage / Light power input		
	Ans (c)		
Q59	In p-n junction diode under equilibrium, select the correct option	CO4	1
a)	Only Minority charge carrier flows		
b)	Majority charge carrier flows		
c)	No charge carrier cross the junction		
d)	Equal no of holes and electrons cross the junction		
	Ans (c)		
Q60	An n-type semiconductor has resistivity 10 ohm-cm. Calculate the no. of donor atoms which must be added to achieve this. Data given : Mobility of electrons : 500 sq. cm/V-s.	CO4	1
a)	1×10^{-15}		
b)	$1.25\times10^{+15}$		
c)	1.25×10^{-15}		
d)	$2\times10^{+15}$		
	Ans (b)		

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