



# MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)  
 Rasipuram - 637 408, Namakkal Dist., Tamil Nadu



## MUST KNOW CONCEPTS

MKC

PHYSICS

2021-22

SUBJECT		21BSS01 & ENGINEERING PHYSICS		
S.No	Term	Notation (Symbol)	Concept/Definition/Meaning/Units/Equation/Expression	Units
<b>UNIT-I ACOUSTICS AND ULTRASONICS</b>				
1	Frequency	f	Number of vibration produced per second	Hz
2	Weber Fechner law	L	$L=K \log I$ . Loudness is directly proportional to the logarithm of the sound intensity	No Unit
3	Reverberation time	T	$T = 0.165V/A$ . V-Volume of the hall and A is the total absorption	sec
4	Piezo electric effect	--	When the force is applied along the opposite faces of a quartz crystal called mechanical axis, the charges are developed across the other two opposite faces called electrical axis. This is called piezo electric effect	No Unit
5	SONAR	--	Sound Navigation and Ranging	No Unit
6	Velocity of sound wave in sea water	v	$v = 2d/t$ d-depth of the sea, t- time interval between transmitted and received signal	m/s
7	Transducer	-	It is convert sound signal into electrical signal	No Unit
8	NDT	--	Non-Destructive Testing. Locates flaws within a material without destroying the product.	No Unit
9	Frquency of the ultrasonic wave.	f	Greater than 20,000Hz	Hz
10	Natural frequency of the vibrating rod	f	$f = \frac{1}{2l} \sqrt{\frac{E}{\rho}}$ l-length of the rod, E- young's modulus of the rod, $\rho$ – density of the rod	Hz
11	Frequency range of the audible sound	f	20Hz to 20KHz	Hz
12	Absorption coefficient	a	Ratio of sound energy absorbed by the surface to that of total sound energy incident on the surface	Open Window Unit or sabine

13	Name of the sound absorbing materials	-	Curtain, Carpet, An Audience, Fiber board.....etc.	No Unit
14	Cavitation	-	The process of creation and collapse of bubbles due to negative local pressure created inside the bubble.	No Unit
15	Techniques of NDT method	-	1.Pulse echo method 2.Through transmission method 3.Resonance method	No Unit
<b>UNIT –II LASER</b>				
16	LASER is acronym for	-	<b>Light Amplification by Stimulated Emission of Radiation</b>	No Unit
17	Principle of laser	-	Population inversion, Stimulated emission	No Unit
18	Properties of Laser	-	High intensity, Monochromaticity, Coherency and Directionality	No Unit
19	Population inversion	$N_2 > N_1$	Achieving more number of atoms in the excited state ( $N_2$ ) compared to the ground state ( $N_1$ )	No Unit
20	Band gap energy	$E_g$	$E_g = \frac{hc}{\lambda}$ h-Planck's constant, c-speed of light, $\lambda$ -wavelength of the source	eV
21	Planck's constant	h	$6.625 \times 10^{-34}$	Js
22	Pumping Method	-	Artificially raising atoms from ground state to excited state by external source	No Unit
23	Active medium	-	Medium where the laser action is takes place between various energy levels	No Unit
24	Types of Pumping methods	-	Optical Pumping, Electric discharge, Inelastic collision between atoms, Direct Pumping	No Unit
25	Quenching Process	-	The Process of rapid heating and cooling	No Unit
26	Types of laser	-	Solid state laser, liquid laser, Gas laser, Diode laser. etc.	No Unit
27	Some Industrial applications of laser	-	Laser welding, cutting, drilling and heat treatment	No Unit
28	Medical applications of laser	-	Detached retina treatment, micro surgery, cancer treatment, Medical endoscope	No Unit
29	Types of semiconductor diode laser	-	1.Homo junction semiconductor diode laser 2. Hetro junction semiconductor diode laser	No Unit
30	Holography	-	Lens less photography, 3D images of the object can be recorded.	No Unit

## UNIT –III FIBER OPTICS AND ITS APPLICATIONS

31	Fiber optics	--	The study of propagation of light through the fiber cable.	No Unit
32	Principle of fiber optics	-	Fiber optics works on the principle of <b>Total Internal Reflection</b>	No Unit
33	Condition for Total internal reflection	$\theta_i > \theta_c$	1. Light should travel from denser to rare medium 2. Angle of incidence should be greater than critical angle	No Unit
34	Important parts of the fiber optic cables	-	1.Core (denser medium) 2.Cladding (rare medium)	No Unit
35	Acceptance angle	$\theta_i$	$\theta_i = \sin^{-1} \frac{\sqrt{n_1^2 - n_2^2}}{n_0}$ the maximum angle at which a ray of light can enter through the fibre so that the light will be totally internally reflected.	No Unit
36	Numerical Aperture	NA	$NA = \sqrt{n_1^2 - n_2^2}$ Sine of the acceptance angle of the fiber	No Unit
37	Fractional Index change	$\Delta$	$\Delta = \frac{n_1 - n_2}{n_1}$ Ratio of difference in refractive index of core and cladding to the refractive index of core.	No Unit
38	Types of optical fiber based of refractive index profile	-	1.Step index fiber 2.Graded index fiber	No Unit
39	Multimode fiber	-	Multimode fiber is one which light ray travels in more than one path.	No Unit
40	Types of splicing technique in fiber optics	-	1. Fusion splicing 2.Mechanical splicing	No Unit
40	Attenuation loss in fibre	-	Loss of power by the optical signal in the fiber. $Attenuation = \frac{10}{L} \log \left( \frac{P_{out}}{P_{in}} \right)$	dB/Km
41	Types of dispersion loss	-	1.Chromatic 2.Inter modal 3.Waveguide dispersion	No Unit
42	The basic components of fiber optic communication system	-	1.Transmitter 2.Optical fiber 3.Receiver	No Unit
43	Photo detector	-	Device used to convert Light energy into electrical energy	No Unit
44	Use of fiber endoscope	-	Endoscope is used to study the interior parts of the human body	No Unit

45	Basic material used in fiber optic cable		1.Glass 2.Plastic	No Unit
<b>UNIT-IV CRYSTAL PHYSICS</b>				
46	Crystalline solid	-	Atoms are arranged in regular manner	No Unit
47	Amorphous Solid	-	Atoms are arranged in irregular manner	No Unit
48	Space lattice	-	Regular and periodic arrangement of atoms in 3D space	No Unit
49	Unit cell	-	Smallest portion of entire crystal structure	No Unit
50	Miller indices	(hkl)	Reciprocals of the intercepts made by the plane on crystallographic axis	No Unit
51	Atomic radius	r	Half of the distance between any two nearest neighbor atoms	No Unit
52	Coordination number	CN	Number of nearest neighbor atoms for a particular atom	No Unit
53	Primitive cell	-	Unit cell which contains only one lattice point	No Unit
54	Atomic packing factor	APF	Ratio between volume occupied by total number atoms in the unit cell and volume of the unit cell	No Unit
55	d spacing in cubic lattice	-	$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$	No Unit
56	Atomic radius of and APF of BCC structure	-	$r = \frac{a\sqrt{3}}{4}$ , APF is 0.68	No Unit
57	Atomic radius of FCC structure	-	$r = \frac{a\sqrt{2}}{4}$	No Unit
58	Coordination number of SC,FCC and HCP structures	-	Coordination number for SC structure is 6, Coordination number for FCC structure is 12 Coordination number for HCP structure is 12	No Unit
59	Crystal defect	-	Crystal defect is defined as the deviation of perfect periodic array of atoms in the crystalline materials.	No Unit
60	Types of crystal defects	-	1.Point defects 2.Line defects 3.Surface defects 4.Volume defects	No Unit
61	Dimensional representation of defects	-	1.Point defect is zero dimensional defect 2. Line defect is one dimensional imperfection 3. Surface defect is two dimensional defect	No Unit
<b>UNIT-V PROPERTIES OF MATTER AND THERMAL PHYSICS</b>				
62	Stress	-	Force Applied Per Unit Area (F/A)	N/m <sup>2</sup>
63	Strain	-	Ratio of the change in shape to the original shape	No Unit

64	Modulus of elasticity	E	E = Stress/ strain	No Unit
65	Elastic Limit	-	The maximum stress up to which a body exhibits the property of elasticity is called elastic limit.	No Unit
66	Relationship between three modulus of Elasticity	-	or $Y = \frac{9K\eta}{\eta + 3K}$	No Unit
67	Poisson's Ratio	-	The relation between lateral strain and longitudinal strain	No Unit
68	Hooke's Law	-	Within the elastic limit stress is directly proportional to strain	No Unit
69	Factors affecting elasticity	-	1.Temperature 2. Impurities 3.Hammering and rolling 4.Annealing 5.Stress	No Unit
70	Beam	-	The rod of uniform cross-section (circular or rectangular) whose length is large in comparison to its breadth and thickness.	No Unit
71	Cantilever	-	a thin uniform beam fixed horizontally at one end and loaded with a weight at the other end.	No Unit
72	Modes of heat transfer	-	1.Conduction 2.Convection 3.Radiation	No Unit
73	Convection	-	Transfer of heat from one part of the medium to another part by the actual movement of the heated particles.	No Unit
74	Newton's law of cooling	-	For a small a small temperature difference between the body and its surrounding, the rate of cooling of a body is directly proportional to the temperature difference and the surface area. $\frac{dT}{dt} = -k(T - T_0)$	No Unit
75	Thermal conductivity	-	The quantity of heat flowing is one second through a unit cube of material when its opposite faces are maintained at a temperature difference of 1°C.	No Unit
<b>Faculty term Prepared</b>		1.Mr.J.Venkatesan 2. Dr.D.Anbuselvi 3. Mr.D.Prabhudass		<b>Signature</b>

**HoD**