

# SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY

Subject Code: BAS 101

Course: B. Tech.

Sections: A,B,E

Subject: Engineering Physics

Semester: 1<sup>st</sup>

Branch: ALL

SECOND SESSIONAL EXAMINATION, ODD SEMESTER, (2022-2023)

Time – 2 hrs.

SECTION – A

Maximum Marks – 45

1. Attempt ALL questions in brief.

Q N	QUESTION	Marks	CO	BL
a.	Missing order of grating	2	CO3	L1
b.	Why newton's rings are circular and center spot is dark.	2	CO3	L2
c.	State of Population inversion	2	CO4	L2
d.	Dispersion loss in fibre.	2	CO4	L2
e.	Persistent current	2	CO5	L1
f.	High temperature superconductor.	2	CO5	L1

SECTION - B

2. Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Show that interference pattern obtained by thin film in reflected light and transmitted light are complimentary to each other	5	CO3	L4
b.	Write Rayleigh's criteria of just resolution. Derive an expression for the resolving power of plane transmission grating.	5	CO3	L4

Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	calculate the numerical aperture, acceptance angle, critical angle , normalized frequency (V-number) and number of modes of the following data: $\mu_{\text{core}} = 1.50$ , $\mu_{\text{cladding}} = 1.45$ , Diameter of core = 50 $\mu\text{m}$ , wave length of light $\lambda = 0.85 \mu\text{m}$ .	5	CO4	L5
b.	In N.R experiment, the diameters of 4 <sup>th</sup> and 12 <sup>th</sup> rings are 0.4 cm and 0.7 cm respectively. Find the diameter of 20 <sup>th</sup> ring.	5	CO4	L5

Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	The optical power, after propagating through a fibre that is 500m long is reduced to 25% of its original value . calculate the fibre loss in dB/km.	5	CO5	L5
b.	Superconducting mercury has a critical temperature of 4.2K at zero magnetic field and a critical magnetic field 0.0306 tesla at 0K .Find the critical magnetic field at 2 K.	5	CO5	L5

### SECTION - C

5. Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Discuss the phenomena of Fraunhofer's diffraction due to single slit and show that the relative intensity of first secondary maxima is about 4.5% of the principal maxima. i.e  $I_0 : I_1 : I_2 : \dots = 1 : \frac{1}{21} : \frac{1}{62} : \dots$	6	CO3	L2
b.	(i) Prove that for reflected light in Newton's rings Experiment, the diameters of dark rings are proportional to square root of natural number. (ii) Light of wave length 6000Å falls normally on a wedge shape film of refractive index 1.4 forming fringes that are 2.0 mm apart. Find the angle of wedge in seconds.	3  3	CO3	L2  L5

6. Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Differentiate 3 level and 4 Level Laser on the basis of construction and energy level diagram.	6	CO4	L4
b.	What do you mean by acceptance cone, acceptance angle and numerical aperture? Classify fibers based on mode of propagation and refractive index profile	6	CO4	L2

7. Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	What is Meissner's Effect? Show that magnetic susceptibility of superconductor is negative. Distinguish between Type I (soft ) and Type II (hard) superconductor.	6	CO5	L2
b.	Explain quantum well, quantum wire and quantum dot. Explain the synthesis, properties of Nano Material using top down approach (CVD- chemical vapour deposition).	6	CO5	L2