SHRI S.H.KELKAR COLLEGE OF ARTS, COMMERCE& SCIENCE, DEVGAD

SECOND TERM END EXAMINATION MA/AP 2023

USPH 401

MAX.MARKS:80 DURATION: 2 HOURS

N.B (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

(iii) Use of non-programmable calculator is allowed.

Q 1.A) Attempt **any One.** 10

1. Give an account of Fresnel's theory of diffraction at a straight edge. Explain the diffraction pattern on the basis of Fresnel's half period strips.
2. Explain the Fraunhoffer diffraction at a single slit. Derive an expression For the width of a central maxima.

B) Attempt **any Two.** 10

1 Distinguish between Interference and Diffraction.
2 Determine the number of lines in 1 cm of the grating surface when a plane transmission grating diffracts second order through for incident light of wavelength 5000 Å.
3 A very narrow vertical slit illuminated by a light of a wavelength 5893 Å casts a shadow of a vertical wire of diameter 3 × m, placed at a distance of 500 cm from the slit on a screen 2.0 m away from the wire. Find the number of fringes inside the shadow.
4 Distinguish between Single slit and Double slit diffraction pattern.

Q. 2. A) Attempt **any One.** 10

1 What do you understand by 'double refraction'? Explain production of linearly polarized light through Nicol prism.
2 Explain the construction and working of (a) quarter – wave plate. (b) half – plate. Determine their thickness and explain what will happen what will happen if they are placed in the path of a plane-polarized beam.

B) Attempt **any Two.** 10

1 What is meant by 'Polarization of light'? Explain.
2 Write a note on: a) Polarizer – Analyser.
3 Production of Elliptically polarised light.
4 Two nicol's are so obtained that the maxima of light is transmitted. Find to

What fraction of its maxima value is intensity of transmitted light reduce when the analyser is rotated through 30°?

Q.3 A) Attempt **any One.** 10

1. Determine the decimal numbers represented by the following binary Numbers.

   (a) 110101 (b) 11111110 (c) 1011.101 (d) 11011.0011

   (e) 1100100 (f) 11001.011 (g) 11111111 (h) 0.11100

2. What is D flipflop? What is its advantages over R-S flip-flop?

B) Attempt **any Two.** 10

1. Write difference between the, Asynchronous and synchronous counter.
2. Write difference between the, Binary up and down counter.
3. Define bit, byte and nibble.
4. What is D flip-flop? What are its advantages over R-S flip-flop?

Q.4. Attempt any Four 20

1. Give application of polarized light.
2. For calcite crystal = 1.55, and = 1.45. Find the thickness of a half-wave plate for light of wavelength 5000 Å.
3. Write difference between MOD 5 and divide by 5 counters.
4. Write a short note on signed representation of binary numbers.
5. Write note on E- ray and O-ray.
6. Write note on Quarter wave plate and Half wave plate
7. Write note on double refraction
8. Explain the intensity distribution at a point, inside a geometrical shadow.