D.B.J. COLLEGE
CREDIT AND GRADING SYSTEM
SUB: PHYSICS PAPER-I MARKS-100 TIME- 3Hrs.

N.B.: (1) All questions are compulsory. (2) Figures to the right indicate full marks. (3) Use of non-programmable calculators is permitted. (4) Symbols have their usual meaning.

A) Select the correct option (12)

i. Diffraction effect can be observed in .....
   a) only sound waves, only light waves only ultra sonic waves, sound and light waves both

ii. To observe Fraunhoffer diffraction, wavefront should be.....
   a) Cylindrical , b) plane, c) spherical d) elliptical

iii. Right shifting the contents of shift register by one bit is equivalent to...
   a) dividing the content by 2 b) dividing the content by 10, c) Multiplying the content by 2, d) Multiplying the content by 10.

iv. Parallel lading of the 4 bit register means
   a)left shifting data in all four flip-flops simultaneously, b) right shifting data in all four flip-flops simultaneously, c) loading data in two flip-flops, d) loading data in four flip-flops at the same time.

v. In the case of linearly polarized light, the magnitude of the electric field vector.....
   a) is parallel to the direction of propagation, b) does not change with time, increases with time, c) varies periodically with time.

vi. When ordinary light is made incident on a quarter wave plate, the emergent light is .....
   a) linearly polarized b) circularly polarized c) unpolarized d) elliptically

(B) Answer in one sentence (3)

i. Define byte, nibble.
ii. What is diffraction?
iii. Define Polarization.

(C) Fill in the blanks (5)

i. In a closed SR flip-flops, R is connected with S through an inverter, the circuit is called .....
ii. An optically active compound.....
iii. Transverse nature of light was confirmed by the phenomenon of ..... of light.
iv. Fresnel's diffraction due to a narrow wire the fringe width.... if the diameter of the wire is increased.
v. A full adder consists of.....

D) Attempt any one (8)

iii. Explain the Fraunhofer diffraction at a Single slit.

iv. Explain Fresnel's theory of diffraction at a cylindrical obstacle.

E) Attempt any one

iii. Distinguish between prism spectrum and grating spectra. (4)

iv. Distinguish between interference and diffraction.

F) Attempt any one

Explain Huygens theory of Diffraction. (3)

Derive the intensity formula at any point on the screen is given by $I = I_o(\sin\alpha/\alpha)^2$

Q-3 **A) Attempt any one**

i. What do you understand by double refraction? Explain production of linearly polarized light through Nicol prism. (8)

ii. Give the mathematical analysis of superposition of two linearly polarized waves at right angles to each other.

B) Attempt any one (4)

i. For calcite crystal $\mu_o = 1.565$ and $\mu_E = 1.452$. Find light of wavelength if the thickness of plate is 30×10^{-17} m.

ii. State and explain the law of Malus.

C) Attempt any one

i. Note on wire grid polarizer. (3)

ii. Describe in brief reflection and refraction method for producing plane polarized light.

Q-4 **A) Attempt any two** (8)

i. Explain the operation of MOD-7 counter with the help of its back diagram and output waveforms..

ii. Draw master slave JK flip-flop system? Explain its operation.

B) Attempt any one (4)

i. What is difference between Asynchrnous and synchronous counter

ii. Give a truth table of JK flip-flop What is D flip-flop and T flip-flop

C) Attempt any one

i. Complete the following. show the conversions (3)

b) $(1234)_{10} = (\quad)_2, = (\quad)_8, = (\quad)_{16}$

ii. Convert the following decimal numbers into binary and Octal.

375, 249, 27.125.

Q-5 **D) Attempt any four** (2

i. A grating has 3000 lines / cm. How many orders will be visible if a light of wavelength 5000 A^0 is incident normally on it Show that the amplification factor, for low damping, is equal to the Q-factor.

ii. Note on quarter and half wave plate

iii. Note on: Diffraction due to a narrow wire and wide wire.

iv. What is counter? What is meant by a serial counter and parallel counter?

v. What is positive edge triggering and negative edge triggering of flip-flop?