ACTIVITY CODE: 1903070021

B.Sc. 6th Semester (Honours) Examination, October 2020

Subject Name: *Electronics (H)*

Subject Code: 61712 Course Code: SH/ELC/602/C-14(TH)

Course Title: *Photonics*

Full Marks: 12 Time Allowed: 45 mins

General guidelines

1. Answer all the questions provided in the question paper.
2. The figures in the right hand side margin indicate marks.
3. You should submit the answer script as prescribed by the University guidelines within the stipulated time and way.

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(The figures in the right hand side margin indicate marks
Answer all the questions)

1. Answer *any two* of the following questions: 1×2=2
   (a) What are Newton's ring?
   (b) What is zone plate?
   (c) What is graded index fibre?
   (d) What is half wave plate?
   (e) How would you obtain Newton's rings with bright centre?
   (f) What do you mean by plane polarized light?

2. Answer *any one* of the following questions: 2×1=2
   (a) Why two independent sources can't produce interference pattern?
   (b) State and explain Brewster's law.
   (c) Differentiate between positive and negative crystals.
   (d) Explain the terms: i) Optic axis and ii) Principal section of a crystal.
   (e) State advantages of optical fibers.
   (f) Compare Fraunhoffer and Fresnel class of diffraction.

3. Answer *any two* of the following questions: 4×2=8
   (a) What is interference of light? State the conditions to be fulfilled for the production of sustained, well defined and observable interference fringes. 2+2=4

(b) The acute angle of a biprism of refractive index 1.5 is 2^{o}. A slit is illuminated by a monochromatic light is placed 10 cm from the biprism. If the distance between the two dark fringes observed at a distance of 1m from the biprism is 0.18 mm, find the wavelength of light used. 4

(c) State Rayleigh's criterion of resolution. Derive an expression for the resolving power of a plane diffraction grating. 4

(d) What are the main sections of an optical fibre? Explain the function of each section. 2+2=4

(e) Find the thickness of λ/4 plate, when λ=600nm, n_e=1.553 and n_o=1.544. 4

(f) Describe the state of polarization of the wave represented by

$$\vec{E}(z,t)=\hat{i}\,E_0\cos(kz-\omega t)-\hat{j}\,E_0\sin(kz-\omega t).$$

4

(g) Describe a method for the production of plane, circularly and elliptically polarized light. 4
