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Roll No.....

Total No. of Sections : 03
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Fourth Semester Examination, May-2018

M.Sc. Physics

Paper -I

LASER PHYSICS AND APPLICATION OF LASERS

Time : 3 Hrs. **Max.Marks : 80**

Note : Section 'A' consists of 10 very short answer type questions, all of which are compulsory and should be attempted first. Section 'B' consists of four short answer type questions with internal options. Section 'C' consists of four long answer type questions with internal choice.

Section - 'A'

Answer the following very short-answer-type questions in one or two sentences : (2×10=20)

Q.1 Why population inversion is not possible in two level system?

Q.2 Write down expression for number of modes per unit volume of the cavity.

Q.3 What is quality factor? Explain its physical significance.

Q.4 Why four level LASER is better than three level LASER?

Q.5 What is difference between pulse and tunable LASER?

Q.6 What is multi quantum photoelectric effect?

Q.7 Draw fluorescence spectrum of anthracene.

Q.8 What is difference between stimulated Raman scattering and stimulated emission in LASER?

Q.9 Define numerical aperture and write its expression.

Q.10 What is importance of optical fiber communication?

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Section - 'B'

Answer the following short-answer-type questions with word limit 200-250 : (5 4=20)

Q.1 Explain briefly mode locking in LASER.

OR

What is resonator? Find out vibrational mode of resonator in a cavity.

Q.2 Write short note on NdYAG LASER.

OR

Explain briefly nitrogen LASER and write its important applications.

Q.3 Differentiate Rayleigh and Raman scattering? How Raman spectroscopy is used to explain the structure of molecule?

OR

What is Doppler free two photon spectroscopy?

Q.4 Discuss attenuation in optical fiber.

OR

Explain following terms associated with optical fiber :

a) Single Mode

b) Refractive Index Profile

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Section - 'C'

Answer the following long-answer-type questions with word limit 400-450 : (10 4=40)

Q.1 What are Einstein coefficients? Under thermal equilibrium, establish a relation between them.

OR

What are characteristics of LASER beam? Discuss population inversion and pumping.

Q.2 Explain briefly Ruby LASER? Find out an expression for pumping power.

OR

What are semiconductor LASERS? Why LASERS are known as generation of light?

Q.3 What is two photon processes? Explain study of two photon process in potassium Iodide (KI) Crystal.

OR

Explain requirement and importance of phase conjugation optics.

Q.4 Explain pulse dispersion phenomena in step index fiber in detail.

OR

What is V parameter? Find out relation between V parameter and number of modes in a multi mode fiber.

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