

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), May 2019

B. Tech (Branch: Common to all discipline), Semester II

Roll No.....

PH202: Experimental Physics

Time: 2 hours

Max. Marks: 40

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. Mobiles are not allowed during examination.
5. Non-programmable calculator is allowed.

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| Q.1 | Prove that only first order is possible if the width of a grating element is less than twice the wavelength of radiation. | 03 |
| Q.2 | Explain the hard and soft magnetic materials with examples. How they can be distinguished by tracing B-H curve. | 05 |
| Q.3 | Discuss the conditions which are required to a thin film for working as anti-reflection coatings. Can a thin film of thickness ($\lambda/4$) of magnesium fluoride ($\mu_f = 1.38$) be deposited on a convex lens ($\mu_g = 1.9$) to act as a non-reflecting film? | 03+02
=05 |
| Q.4 | 90 gm of impure sugar when dissolved in one liter water gives an optical rotation of 8.8° , when placed in a tube of length 200 mm. If the specific rotation of sugar is $66^\circ (\text{cm})^{-1}(\text{gm/cc})^{-1}$, find the percentage purity of sugar sample. | 05 |
| Q.5 | Imagine that we chop a continuous laser beam (assumed to be perfectly monochromatic $\lambda_0 = 625.2 \text{ nm}$) into 0.2×10^{-9} sec pulses using some short of shutter. Calculate the resultant bandwidth and coherent length. | 05 |
| Q.6 | An optical fibre has a numerical aperture of 0.22 and a cladding refractive index of 1.58. Find the critical angle and maximum acceptance angle for the fibre in water which has a refractive index of 1.33. | 05 |
| Q.7 | Discuss the essential requirements to produce a laser? How are these conditions fulfilled in producing He-Ne laser? | 05 |
| Q.8 | Solve Schrodinger equation for a free particle of mass m trapped in infinitely deep one dimensional box of width ' a ' and find eigen values and eigen functions for a free particle. If electron is confined to move between two rigid walls separated by 01 nm. Find the De Broglie wavelength representing second allowed energy state of the electron. | 05+02
= 07 |