

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), May 2015

B. Tech./B. Tech+M. Tech/B. Tech+MBA (Branch: CSE, EE ECE), Semester II

Roll No.....

PH101: Engineering Physics

Time: 3 hours

Max. Marks: 100

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.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. The speed at which a particle must be moving so that its mass is double its rest mass is

(a) $\frac{c}{2}$ (b) $\frac{c}{\sqrt{3}}$ (c) $\frac{\sqrt{3}}{2} C$ (d) $\frac{2}{3} C$

- ii. Rest mass of the photon is

(a) infinite (b) $2m_0$ (c) 0 (d) p/c

- iii. In continuous discharge region of the voltage-pulse characteristics

(a) multiple pulses are obtained (b) no pulse is obtained
(c) two pulses are obtained (d) none

- iv. With the help of dynodes, the signal is amplified. [YES/NO]

- v. Examples for _____ emission light are glowing tube light, electric bulb, candle flame, etc.

(a) stimulated (b) spontaneous (c) both a & b (d) none

- vi. The ratio of the helium and neon gaseous atoms are

(a) 1:10 (b) 10:1 (c) 1:1 (d) 1:20

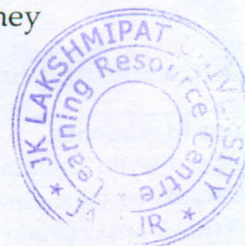
- vii. The temperature coefficient for conductors is positive. (Yes/No)

- viii. If in a Newton's ring experiment the water is filled in the space between the plane glass plate and the convex surface of the plano-convex lens, then

(a) the diameter of the ring will increase
(b) the diameter of the ring will decrease
(c) the diameter of the ring will remain the same (d) both a & b



- ix. The diffraction fringes obtained by a single slit are of
 (a) unequal width and equal intensity (b) equal width and unequal intensity
 (c) equal width and equal intensity (d) unequal width and unequal intensity
- x. Polaroid sun glasses decreases the glare on a sunny day because they
 (a) block a portion of sun light (b) have a special colour
 (c) completely absorb the sun light (d) refract the light



Q.2 Short answer type questions (4 questions @ 2.5 marks)

10

- i. Explain why the excessively thin films seen by reflected light appears dark.
- ii. How diffraction does differ from the interference of light?
- iii. What are the proper frame, proper time and proper length?
- iv. Explain the term quenching process and state characteristics of the quenching agent.

Q.3A What is mode in optical fibre? Distinguish between communication process through single mode step index and multimode step index optical fibre. 05

Q.3B How fast should a rocket be moving such that its length appears to be 90% of its original length? 05

Q.4A What are spontaneous and induced/stimulated emissions? How do pumping and population inversion are achieved in a semiconductor laser? 05

Q.4B An optical fibre has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the acceptance angle for the fibre in water which has a refractive index of 1.33. 05

Q.5A A given voltage sensitive preamplifier requires a minimum input pulse amplitude of 10 mV for good signal/noise performance. What gas multiplication factor is required in an air filled proportional counter with 200 pF capacitance if 5.0 keV X-rays are to be measured? Given that for air, the energy required per ion pair is 26.2 eV. 05

Q.5B Can a thin film of thickness ($\lambda/4$) of magnesium fluoride ($\mu_f = 1.38$) be deposited on a convex lens of ($\mu_g = 1.9$) to act as a non-reflecting film? 05

6A Discuss the phenomenon of double refraction in a calcite crystal. How can a phase retardation plate be obtained from it? 05

Q.6B Plane polarized light passes through a quartz plate with its optic axis parallel to its faces. Calculate the least thickness of the plate for which the emergent beam will be circularly polarized. 05

OR

Q.6B A solution of an optically active solute produces a rotation of 20° of the plane of polarization in a path of 10 cm, when concentration is 20 gm/litre. What is concentration in a solution which produces a rotation of 33° in a path length of 5 cm? 05

Q.7A What is plane transmission grating? Describe with a neat diagram how you would employ it for determination of wavelength of light. 05

Q.7B A plane transmission grating has 6000 lines/cm. Calculate the longest wavelength of light for which spectrum can be obtained. 05

OR

Q.7B A set of 10 parallel equidistant slits of width 0.5 cm each and spacing 1.9 cm are used to study Fraunhofer's diffraction of waves $\lambda = 0.6$ cm falling normally on the plane of slits. Deduce half angular width of second maximum. 05

Q.8 Deduce the relativistic velocity addition theorem. Show that it is consistent with the second postulate of the special theory of relativity (Constant velocity of light). 10

Q.9A What do you understand by scintillators? Describe a Scintillation counter and its mode of operation. What advantages has it over other types of counters? 10

Q.9B Describe the Newton's ring experiment with neat diagram to determine the wavelength of sodium light. What will happen to fringes if the air film between the plano-convex lens and the glass plate is filled with a liquid of refractive index μ . Explain. 10

OR

Q.9B Define optical activity? How will you determine optical rotation of an optically active substance using Biquartz polarimeter? 10

