

POKHARA UNIVERSITY

Level: Bachelor
 Programme: BE
 Course: Physics

Semester: Fall

Year : 2019
 Full Marks: 100
 Pass Marks: 45
 Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Why compound pendulum is preferred than simple pendulum. For compound pendulum, prove that the minimum time period is obtained if the point of suspension and point of oscillations are equidistant from centre of gravity. 1+8
- b) What is amplitude, the wave length and the velocity of the wave represented by $y=5 \sin(6\pi t + 4x)$ Where distance and time are measured in S.I Units? 6
2. a) What are the differences between Interference and diffraction of light? Explain the fraunhoffer diffraction through single slit and hence calculate the width of central maximum. 1+8
- b) A classroom has dimension of $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5sec. Calculate the total absorption of its surface and the average absorption coefficient. 6
3. a) Define electric dipole. Develop a relation of electric field intensity of a dipole not lying along equatorial line. 1+8
- b) A soap film of $5 \times 10^{-7} \text{ m}$ thick is viewed at an angle of 35° to the normal. Find the wavelengths of light in the visible spectrum which will be absent from the reflected light, given that the refractive index of the film is 1.33. 6
4. a) Derive an expression for the growth and decay of current in L-R circuit. Also, show that the value of transient current never exceeds the steady current. 8+1
- b) Find the magnitude of induced emf in a 200 turns coil with a cross-sectional area of 0.16 m^2 , if the magnetic field through the coil changes from 0.10 Wb m^{-2} to 0.50 Wb m^{-2} at the uniform rate over a period 0.02 sec. 6

5. a) Write Maxwell's equations in integral and differential form. Using Maxwell's equation in free space show that speed of electromagnetic wave is equals to the speed of light. 2+7
- b) Obtain the charging time constant of a capacitor in a RC circuit such that current through the resistor is decreased by 50% of its peak value in 10 seconds. 6
6. a) What is wave function? Describe its significance. Derive Schrodinger time independent wave equation for a free particle like electron. 2+7
- b) Prove that the equation of continuity $\vec{\Delta} \cdot \vec{J} + \frac{\partial \rho}{\partial t} = 0$ 6
7. Write short notes on: (Any two) 2x5
- a) Describe Spontaneous emission and Stimulated emission of a radiation
- b) Resistance and Resistivity
- c) Semi-conductor dopping

Bibek

Sami

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Zibek

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Attempt all the questions.

1. a) Why is really S.H.M rare? Deduce the expression for the time period of a compound pendulum and radius of gyration of compound pendulum. 9
- b) A boy claps his hands once every second and hears the echo from a distant building. He hears the echo of each clap mid-way between it and the next clap. If the velocity of sound is 340m/s, what is the distance of the building from the body? 6
2. a) What is diffraction? Differentiate between Fresnel and Fraunhofer diffraction pattern. Discuss the intensity distribution in the diffraction pattern due to single slit. 9
- b) Newton's rings that are formed by sodium light between the flat glass plate and convex lens are viewed normally from above. What will be the order of the dark ring, which will have double the diameter of 40th dark ring? 6
3. a) Discuss the types of optical fiber and explain the working principle of optical fiber. 9
- b) A hall has a volume 2265m³. Its total absorption is equivalent to 92.9m² of open window. What will be the effects of reverberation time if and audience fills the hall and thereby increase the absorption by another 92.9m²? 6
4. a) Show that the magnitude of electric potential along axial line due to linear quadrupole is double than the potential along equatorial line. 9
- b) Obtain the charging time constant of a capacitor in a RC circuit such that current through the resistor is decreased by half of its peak value in 5 seconds. 6
5. a) State and explain Biot-Savart's law. Use it to find the expression for magnetic field on the axis of current carrying coil. 9
- b) Find the strength of magnetic field at the center of rectangular coil of length l and width d, which carries current I. 6

6. a) Write the Maxwell's equation in differential form and their significance. Using Maxwell's equations prove that $\frac{E_m}{B_m} = C$, Where symbol carry usual meaning. 9

b) Discuss the Sabine's formula to obtain the expression for growth and decay of sound energy in room. 6

7. Write short notes on: (**Any two**)

- a) Classify solids on the basis of band theory of solids
 - b) Tunneling effect
 - c) Lorentz force
- 2x5