JHARKHAND Rai University
RANCHI

MODEL PAPER

End Semester Examination Spring- 2025

Program: Diploma (Mining & CSE)
Subject: Basic Physics-II
Subject Code: 8DBSC104 & **3DBSC104**
Semester: II

UNIT-I

Section: I (5 Marks)

1. What is gravitational force? Describe the historical background of it in details.
2. State & Explain Newton's Law of Gravitation in details. Formulate the relation between G **(**Gravitational Constant**)** and g **(**acceleration due to gravity**)**.
3. What do you mean by law of Area, explain with the diagram.
4. Define Universal Gravitation Constant and acceleration due to gravity.

Section: II (10 Marks)

5. (a) Derive the value of 'g' on the surface of earth.
   (b) Derive the value of 'g' of an object situated at a distance of 'h' from the earth surface.
6. Show that acceleration due to gravity does not depend on the mass of a body.
7. Calculate the force of attraction between the objects of mass 50 kg and the Earth (mass of Earth = 6×10^{24} kg) and its distance is 64×10^{5} m.

Section: III (20 Marks)

8. Establish the relation of the force of attraction in between two objects of mass 'm' and the distance will be
   (a) d, (b) 2d , (c) 3d
9. Establish the relationship in between the force of attraction if the distance in between the objects remain same ('d') and the masses are (a) m & m (b) m & 2m (c) 2m & 2m

10. Evaluate that acceleration due to gravity of the earth at the centre of the earth is zero.

UNIT-II

Section: I (5 Marks)

11. Explain Young's Modulus. Define elasticity, stress and strain.
12. What do you mean by normal and shearing stress.
13. Explain Bulk Modulus and Modulus of Rigidity
14. Distinguish between Streamline & turbulent flow.
15. Define viscosity and derive expression for coefficient of viscosity.
16. Explain Reynolds Number and its importance.

Section: II (10 Marks)

17. State and Prove Bernoulli's Theorem.
18. What do you mean by Bulk modulus and Rigidity modulus? What mass should be used to a steel wire of 4 m long and 2 mm in a diameter to stretch it upto 1 mm? The Young's modulus of steel is 2×10^{12} dyne cm^{-2} and g= 981 cm s^{-2}.

Section: III (20 Marks)

19. State and explain Hooke's Law. Discuss the stress strain diagram. Discuss some phenomena associated with elastic behavior of solids.
20. State and prove Stokes Law of viscosity $F = 6\pi\eta vr$

UNIT III

Section: I (5 Marks)

21. Discuss the origin of Electric charge.
22. State and explain Coulomb's law of electrostatics.
23. What do you mean by Electromotive force and Magnetic flux?
24. What do you mean by Magnetostriction and discuss its importance.
25. Define electric flux and expression for electric flux.
26. Define equipotential surface and what are the properties of an equipotential surface?

Section: II (10 Marks)

27. State and explain Faraday's law of Electromagnetic Induction in details.

28. Discuss the importance of Gauss Law and derive an expression for Electric field at a point lies outside the charged sphere.
29. Evaluate an expression for Electric field due to an infinitely long straight wire.
30. State and explain (i) Bio-Savart Law (ii) Right hand Screw Law
31. What do you mean by hard and soft magnet and write down its application.

Section: III (20 Marks)

32. Discuss the origin of Magnetization. What do you mean by Hysteresis curve and explain the process of formation along with its properties?
33. What do you mean by Series connection of capacitors? Derive the expression of voltage drop across each capacitor when three capacitors are connected in series.

UNIT IV

Section: I (5 Marks)

34. What do you mean by reflection of light? Discuss the laws of reflection in details.
35. What do you mean by refraction? Discuss the total internal reflection.
36. Explain Photo-electric effect and write down its applications.

Section: II (10 Marks)

37. What do you mean by Total internal reflection? Write-down its applications.
38. Explain the construction and working of Optical Fiber in details with proper diagram.
39. Describe and explain Davisson and Germer experiment with neat & clean diagrams, Observations and results.
40. Write the Fundamental laws of photo-electric effect. Evaluate Einstein's photoelectric Equation.

Section: III (20 Marks)

41. What is wave particle duality? Find the energy of the neutron in electron volt whose De-Broglie wavelength is 1A.
42. Explain the phenomenon of Dispersion of light. Calculate de-Broglie wavelength Associated with a proton moving with a velocity equal to 1/20th of the velocity of light. (Mass of the Proton=1.67×10^{-27} kg).

Prepared By: Dr. Arindam Ghosh