

BANKIM SARDAR COLLEGE

Part – I (1+1+1) Examination 2020

B.Sc. (General)

Subject: Physics

Group: (1+2+3+4)

Time: 2 Hours

Full Marks: 50

(Answer each group in separate Answer-Sheets)

Group: 1

(Answer in separate Answer-Sheets)

Answer Question 1 and any two Questions from Question 2 to 5

1. Find the angle between two vectors $\vec{A} = 3\hat{i} + 2\hat{j} - 6\hat{k}$ and $\vec{B} = 4\hat{i} - 3\hat{j} + \hat{k}$

2.5

OR

For $\psi = 2xz^4 - x^2y$, find $\vec{\nabla}\psi$ at a point (2,2,-1).

2.5

2. Prove that $\vec{\nabla} \cdot (\vec{\nabla} \times \vec{A}) = 0$

5

3. State and prove parallel axes theorem of moment of inertia.

2+3

4. If $\vec{A} = xy\hat{i} + yz\hat{j} - zx\hat{k}$ find the divergence and curl of the vector \vec{A}

5

5. Find an expression for the gravitational potential and intensity at a point inside a solid sphere.

5

Group: 2

(Answer in separate Answer-Sheets)

Answer Question 6 and any two Questions from Question 7 to 10

6. Write down the dimension of coefficient of viscosity and that surface tension.

2.5

OR

What is the neutral surface of a bending rod?

2.5

7. Deduce an expression for the amount of energy stored in an elastic body due to a longitudinal strain. 5
8. Find an expression for height to which a liquid may rise in a capillary tube. 5
9. What is meant by streamline motion and turbulence? What is Reynold's number? On what factors does the critical velocity depend? 2+1+2
10. Show that shear is equivalent to an extension and an equal compression in two mutually perpendicular directions. 5

Group: 3

(Answer in separate Answer-Sheets)

Answer Question 11 and any two Questions from Question 12 to 15

11. Write the vander Wall's equation for n moles of real gas. 2.5
- OR
- Explain the concept of mean free path of the molecule of a gas. 2.5
12. Calculate the work done in an adiabatic process. 5
13. Find an expression for the energy density of one dimensional plane progressive wave. 5
14. Find the expression for velocity of transverse waves in a string. 5
15. Write down the differential equation of the damped simple harmonic motion when the motion is along the x-axes and solve it. 5

Group: 4

(Answer in separate Answer-Sheets)

Answer Question 16 and any two Questions from Question 17 to 20

- 16.** Define 'degrees of freedom' for a diatomic gas. **2.5**
OR
Explain, why a falling body attains terminal velocity in a viscous medium. **2.5**
- 17.** Define the emissive power and absorptive power of a body. Show from Kirchhoff's law, a good radiator is also a good absorber. **1+4**
- 18.** Find the condition of Achromatism of two thin lenses separated by a distance. **5**
- 19.** State Fermat's principle. Deduce Snell's law of refraction by applying this principle. **1+4**
- 20.** What do you mean by linear magnification in optical instruments? What are the advantages of a compound eye-piece? Why cross wire is not used in Huygen's eye-piece? **2+2+1**