

**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: 25**

**(Answer each group in separate Answer-Sheets)**

---

**Group: 1**

**(Answer in separate Answer-Sheets)**

**Answer Question 1 and any one Question from Question 2 to 5**

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

2.5

OR

For  $\psi = 2xz^4 - x^2y$ , find  $\vec{\nabla}\phi$  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 one Question 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 any one Question from Question 11 to 14**

11. Calculate the work done in an adiabatic process. 5
12. Find an expression for the energy density of one dimensional plane progressive wave. . 5
13. Find the expression for velocity of transverse waves in a string. 5
14. 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 any one Question from Question 15 to 18**

15. 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
16. Find the condition of Achromatism of two thin lenses separated by a distance. 5
17. State Fermat's principle. Deduce Snell's law of refraction by applying this principle. 1+4
18. 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