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Physics (Sub./Gen.)

Answer five questions in all, selecting two questions each from group-B and Group-C, in which, Group-A is compulsory.

Group-A

1. Answer any three questions :
 - (a) Distinguish between scalar field and vector field.
 - (b) Show that $\text{Curl grad } \phi = 0$.
 - (c) Distinguish between Octal System and Hexa-decimal System.
 - (d) Distinguish between a perfect gas equation and a real gas equation.
 - (e) What is a perfectly black-body ? State and explain Stefan's Law of black body radiation.
 - (f) Distinguish between free vibration, forced vibration and damped vibration.

Group-B

Answer any two questions of the following :

2. Enunciate the basic postulates of special theory of relativity and deduce Lorentz Transformation equation.
3. Define the elastic constants Y , K , η and σ . Deduce relation connecting these quantities.
4. Obtain Poiseuille's formula for flow of incompressible liquid through a capillary tube. Also, discuss the corrections applied to this formula.
5. What do you understand by ultrasonic waves ? How are they produced and detected ?

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Answer any two questions of the following :

6. Derive an expression for thermal conductivity of a gas on the basis of Kinetic theory of gases. Also, discuss its dependence on temperature.
7. Using Maxwell's thermodynamic relation, establish Clausius-Clapeyron latent heat equation and find out the effect of pressure on boiling point of a liquid and melting point of a solid.
8. What do you understand by ripple factor ? Obtain its value for half and full wave rectifier.
9. Write short notes on any two of the following :
 - (a) Zener diode
 - (b) Light emitting diode (LED)
 - (c) Basic components of a Computer
 - (d) Significance of Michelson-Morley experiment