

PHYSICS

Full Marks: 100

Group A

Mechanics:

1. **Elasticity:** Concept of safety factor, different types of elastic constants and their relations, twisting of a cylinder and Barton's apparatus, depression of beam under its own weight, I - section girders 4
2. **Rigid body dynamics:** Solid sphere, fly wheel, uses of fly wheel 3
3. **Surface Tension:** Introduction , surface tension and surface energy, pressure difference across a spherical surface , excess pressure inside a liquid drop or an air bubble, excess pressure inside a soap bubble, angle of contacts, capillarity , velocity of a wave of the surface of a liquid, effect of a gravity, surface tension effect. 4
4. **Fluid motion, viscosity and low pressure:** Stream line motion and rate of flow, Equation of continuity, Bernoulli's theorem, Venturimeter, Bunsen burner, Atomiser, Filter pump, Carburetor, Viscosity, Stoke's law, Poiseuille's method for coefficient of viscosity, Ostwald's viscometer, Rotation viscometer, Air pump, Rotary oil pump, Mercury diffusion pump, Pirani gauge, Kaudsen gauge. 5
5. **Waves:** Simple harmonic motion, Helmholtz resonator, torsional pendulum, Compound [pendulum, Longitudinal and transverse waves, Pulses and wave trains Wave fronts, production properties and uses of ultrasonic waves. 4

Heat & Thermodynamics

1. **First law of thermodynamics:** Perpetual Motion machine of the first kind, Application of the first law, analysis of flow process, Control volume, analysis of steady process, Throttling coefficient 4
7. **Second law of thermodynamics:** Various statements, Carnot's engine and its efficiency, Carnot's theorem, Absolute scale of temperature, Entropy, S-T diagram, Entropy of a perfect

gas, Principle of entropy increase, Availability in terms of entropy change.

5

8. **Power and refrigeration cycles:** Vapour power cycles, Carnot's cycles , Rankine cycle, Reheat and regeneration, Gas power cycle, Otto cycle, Diesel cycle , Brayton cycle , Ericsson cycle

6

9. **Refrigeration cycles:** The reversalnot's cycle, Vapour compression refrigeration, Gas cycle refrigeration, Absorption refrigeration, Electro flux absorption refrigerator

4

10. **Thermal radiation:** Concept of black body radiation, Provost's theory of heat exchange, Stefan's law Kirchhoff's law of black body radiation, Wein's displacement law, Plank's quantum theory of radiation

11. **Solar radiations:** Composition and temperature of the sun, solar constants, application of solar radiations for water and space heating, basic principle of solar drier and cookers

4

Group " B "

Optics:

12. **Interference:** Young's double slits experiment, optical path length, coherence, Newton's rings, and colour in thin films due to transmitted and reflected light

6

13. **Diffraction:** Frasnell's assumption zone plate, diffraction at a slit, Fresnel and Fraunhofer diffraction, Diffraction pattern due to narrow slit, maxima and minima in Diffraction patterns, theory of plane transmission grating resolving power.

5

14. **Polarization:** - Polarization of light, polarization by refraction and reflection, Brewster's laws Malus law, polarization by absorption and scattering, Nicol's prism

4

15. **Optical instruments:-** The polarizing microscope , ultraviolet microscope, interference microscope, phase contrast microscope , electron microscope.

6

16. **I-R & U:V spectroscopy:** Investigation of I-R spectrum I-R sources, detectors, I-r spectrographs, applications of Infrared rays, investigation of U-V spectrum, U-V sources, detectors, properties and applications of U-V radiation, elementary concept of U-V spectrographs.

6

ELECTRICITY:

17. **Alternating currents:** Average and r.m.s value of A.C form factor, A.C through R L & C, LC, RC, RL and LCR circuits. Series and parallel resonant circuits, power in AC.circuits wattles component, skin effect ,choke coil ,Transformers,AC meters, Basic concept of distribution of A.C single, three phase and poly phase current, star, delta and wyes connection,A.C .D.C dynamics, D.C motors, Motor starter, reversal of direction of the rotation uses of electric motors, types of motors.

10

MODERN PHYSICS:

18. Thomson's mass spectrograph, Bainbridge and Astons mass spectrographs, discovery of isotopes, mass energy equivalence

6

19. Isotopes, application of radio isotopes, medical, industrial, agricultural and scientific research

5

20. High energy radiations and health physics: X-Rays and gamma rays: Study and their practical applications biological effects or radiations, hazards due to external and internal sources, hazards due to radio isotopes, nuclear weapons, shelter from radiations, food and water supply and decontamination, radio sensitivity, radiation dose and radioactivity units

21. **Semiconductor physics:**

Transistors: PNP, NPN, common emitter, common base and common collector characteristics, common emitter amplifier, phase inversion transistor switch, state of transistors, logic gates

5

22. **Pollution:**

Air pollution: Structure of the atmosphere from temperature, chemical and physical point of view, air pollutants, effects of air pollution

2

Water Pollution: Sources of water pollution, effects of water pollution, standards for fresh water, water pollutants

2

Thermal pollution: Sources of thermal pollution. effects of thermal pollution, control of thermal pollution 1

Noise pollution: Introduction, effects

Noise pollution: Introduction, effects of noise pollution, prevention and control of noise pollution.

Radioactive pollution: Introduction, Nuclear weapons and testing, effects of radioactive pollution, preventive and control

1

Environmental Pollution: Effects on humans, animals and plants, global effects, effects on climate 1

Practical:

1. Measurement of moment of inertia of a fly wheel
2. Compound pendulum
3. Density/sp.gr of food materials (egg, spices, grains, fats and oils)
4. Surface tension of liquids/milk.
5. Coefficient of viscosity of mustard oil (Stoke's method)
6. Refractive index of transparent liquids
7. Measurement of cp/cv of air by Clement & Desorme's apparatus
8. Measurement of Young's modulus and Rigidity modulus
9. Measurement of sp.heat of vegetable oils and grains
10. To study the characteristics of a triode, diode and NPN & PNP transistors
11. Melting points of ghee and vegetable ghee

12. To use a Geiger-Muller counter for the study of background radiations and measurement of half -life of a radioactive source

Text books:

1. J.K Ghosh. DN.Basudeo, Electricity
2. Brijlal Subramanham D.N Basudeo, D.S Mathur ,Mechanics
3. Greene Murugesan & J.B Rajan. Modern Physics
4. Brijlal, Subramanham & Khadlwal. Optics
5. Brijlal, Subramanham, Heat & Thermodynamics