

## ENGINEERING PHYSICS

TH-3

Periods / Weeks: 05 periods

Theory : 80

Total periods : 75 periods

I.A. : 20

Examination – 3 Hours

### Topic wise distribution of periods

Sl. No.	Topics	Periods
1	Introduction to Units & Dimensions, scalars & vectors	02
2	Linear & Curvilinear motion	04
3	Gravitation & S. H. M.	04
4	Sound & Acoustics	09
5	Heat & Thermodynamics	08
6	Optics	04
7	Magnetism	04
8	Electrostatics	05
9	Current Electricity	09
10	Magnetic effect of current	05
11	Electromagnetic induction	05
12	Nuclear & Modern physics	10
13	Space Communication	02
14	Remote Sensing	04
	<b>TOTAL</b>	<b>75</b>

### **Objectives :**

Engineering, being the science of measurement and design, has been offspring of Physics that plays the primary role in all professional disciplines of engineering. The different streams of Physics like Optics, laws of motion, Semiconductor Physics, Surface Physics, Nuclear physics, Energy Studies, Materials Science, etc provide **Fundamental Facts, Principles, Laws, and Proper Sequence of Events** to streamline Engineering Problems.

#### **1.0 UNITS AND DIMENSIONS, SCALARS & VECTORS**

- 1.1 Define dimension and dimensional formula of physical quantities
- 1.2 Application of Dimensional Analysis
- 1.3 Explain vector addition & subtraction
- 1.4 Triangle law and parallelogram law of vector addition, Resolution of vector, Simple Numerical problems

#### **2.0 LINEAR & CURVILINEAR MOTION:**

- 2.1 Equation of motion along a straight line (No derivation)
- 2.2 Projectile Motion
- 2.3 Terms related to Projectile motion
- 2.4 Equation of Projectile path.
- 2.4 Simple numerical problems may be asked.

- 2.5 Define Kinetic Energy and Potential Energy. Work, Energy theorem & application to simple numerical problems
- 2.6 Define uniform circular motion, angular displacement, angular velocity and acceleration.
- 2.7 Define centripetal and centrifugal forces.
- 2.8 Banking of tracks and Bending of Cyclist (simple problems may be asked).

### **3.0 GRAVITATION AND S. H. M.**

- 3.1 State & explain Newton's Law of Gravitation.
- 3.2 State and explain Kepler's laws and its application.
- 3.3 Variation of 'g' with altitude depth & latitudes (No derivation). (Simple numerical problem).
- 3.4 Principle of launching of satellite.
- 3.5 Definition of Escape velocity and orbital velocity of satellite.
- 3.6 Define amplitude, frequency and time period in S.H.M.
- 3.7 Find out velocity and acceleration of a particle executing SHM.

### **4.0 SOUND & ACOUSTICS**

- 4.1 Progressive wave and stationary wave.
- 4.2 Define Longitudinal & Transverse Waves.
- 4.3 State different wave parameters & establish relation between them.
- 4.4 Derive Newton's formula for velocity of sound and apply Laplace's correction on it.
- 4.5 State the effects of temperature, pressure and humidity on velocity of sound.
- 4.6 Production of ultrasonic wave and its uses in industries.
- 4.7 Concept of Doppler's effect & its application.
- 4.8 Acoustics of building.
- 4.9 Reverberation, Reverberation time- Echo
- 4.10 Coefficient of absorption of sound energy .( Simple problems may be asked)

### **5.0 HEAT AND THERMODYNAMICS**

- 5.1 Define different units of heat.
- 5.2 Define and explain specific heat, thermal capacity, water equivalent and latent heat.
- 5.3 State the principle of calorimetry (Numerical problems).
- 5.4 Define Coefficient of Linear, Superficial and Cubical expansion of Solids.
- 5.5 Establish the relationship between them.
- 5.6 Define Coefficient of real and apparent expansion of liquids and establish the relation between them.
- 5.7 1<sup>st</sup> law of thermodynamics (statement of equation only).
- 5.8 Define  $C_p$  and  $C_r$  and establish the relation between.
- 5.9 Define thermal conductivity and its units.
- 5.10 Define mechanical equivalent of heat.

### **6.0 OPTICS**

- 6.1 Reflection, Refraction, Laws of Reflection and Refraction.
- 6.2 Define Critical Angle, Total Internal Reflection, Establish relation between Refractive Index and Critical angle.
- 6.3 State mirror and lens formula (No Derivation), Simple Numerical problem.
- 6.4 Define power of mirror, Lens and its unit.

- 6.5 Lens maker formula (No derivation) and simple numerical problems.
- 6.6 Elementary ideas about optical fiber and its two application.
- 7.0 MAGNETISM**
- 7.1 State and explain Coulomb's law in Magnetism, Define unit Pole, Magnetic field Intensity.
- 7.2 Define magnetic line of force, Magnetic flux, Flux density, Magnetic moment of a Bar magnet.

## **8.0 ELECTROSTATICS**

- 8.1 State and explain Coulomb's law in Electrostatics, Define unit charge.
- 8.2 Define Electric field intensity and Electric Potential and Electrical Potential energy.
- 8.3 Relation between electric field and potential gradient.
- 8.4 Explain charging by Induction.
- 8.5 Define capacity of a conductor and capacitor. State their units.
- 8.6 Derive the capacity of a parallel plate capacitor and the effect of dielectric on the capacitance of the capacitor.
- 8.7 Grouping of capacitors in series and parallel. Simple Numerical problems.
- 8.8 Energy stored in case of a parallel plate capacitor.

## **9.0 CURRENT ELECTRICITY**

- 9.1 Define Electric Current and state it's unit.
- 9.2 State and explain Ohm's law.
- 9.3 State the laws of resistance, Define specific resistance.
- 9.4 Effect of temperature on resistance.
- 9.5 Grouping of resistors in series and parallel.
- 9.6 State and explain Kirchoff's laws and it's application to Wheatstone Bridge.
- 9.7 Define Electrical Energy and Electric Power.
- 9.8 State and explain Joule's laws of heating effect of electric current.
- 9.9 Simple numerical problems to be asked.

## **10.0 MAGNETIC EFFECT OF CURRENT**

- 10.1 State and explain Biot-Savarts law.
- 10.2 State the formula for Magnetic field Induction due to current through a straight wire and at the centre of a circular coil, simple numerical problems.
- 10.3 Force experienced by a current carrying conductor placed in a magnetic field.
- 10.4 Fleming's left hand Rule.

## **11.0 ELECTROMAGNETIC INDUCTION**

- 11.1 State Faraday's laws of Electromagnetic Induction.
- 11.2 Lenz's law, Fleming's Right Hand Rule.
- 11.3 Emf induced due to translational motion of a conductor in a uniform magnetic field.
- 11.4 Explain self induction & Mutual induction

## **12.0 NUCLEAR AND MODERN PHYSICS**

- 12.1 Define Atomic Number, Mass Number, Mass Defect and Binding Energy.

- 12.2 Explain Nuclear fission and Nuclear fusion.
- 12.3 Application of nuclear fission & nuclear fusion.
- 12.4 LASER : Definition, Properties and application.
- 12.5 Describe the properties & uses of Alpha, Beta and Gamma rays.
- 12.6 X-Rays : Production of X-Rays, Application of X-Rays.
- 12.7 Explain the concept of Superconductivity & Meissner's effect & it's application.
- 12.8 Brief idea about particle accelerator & it's application

### **13.0 SPACE COMMUNICATION**

- 13.1 Elementary idea about space and sky wave propagation
- 13.2 Satellite communication (elementary idea).

### **14.0 REMOTE SENSING**

- 14.1 Introduction :
- 14.2 Active & passive remote sensing- Components of remote sensing
- 14.3 Data acquisition, Data analysis
- 14.4 Reference data-Electromagnetic spectrum- microwave remote sensing,
- 14.5 Use of RADAR , Indian remote sensing satellite.

### **REFERENCE BOOK**

1. Text Book of +2 Physics – Vol-I & II by Barik, Das & Sharma (Klayani Publishers).
2. Engineering Physics by Gaur & Gupta.  
(Dhanpat Rai & Co., New Delhi)
3. Resnick and Holiday Physics – Wiseley Toppan Publishers
4. Engineering Physics – B. L. Theraja, S. Chand Publishers, New Delhi
5. Modern physics- R. Murugesan(S. Chand Publication)
6. Remote Sensing –Dr M Anjali Redy(JNTU) Hyderabad.
7. Electricity & Magnetism- Srivastava- S.Chand publishers, NewDelhi.
8. Fiber Optics-D.A.Hill
9. Modern Engineering Physics –by A.S Basudev

# ENGINEERING PHYSICS PRACTICAL

**Periods / week – 04**  
**Practical Examination – 04 Hours**

**Sessional – 25 Marks**  
**Practical – 25 Marks**

1. Measurement of volume of a cylinder by slide calipers.
2. Measurement of cross-sectional area of a wire by Screw Gauge.
3. Measurement of radius of curvature of a spherical surface by a spherometre.
4. Determination of specific gravity of insoluble solid heavier than water by physical balance by equal oscillation method.
5. To find refractive index of a Prism by drawing I - D curve.
6. (a) To draw magnetic lines of force & locate the neutral points due to a bar magnet with N-pole pointing North.  
(b) To repeat the experiment with N-pole pointing South.
7. Determination of "g" by simple Pendulum.
8. Verification of Ohm's law by Ammeter-Voltmeter method.
9. Determination of co-efficient of friction by inclined plane method.
10. Measurement of specific resistance of a wire by Meter Bridge.
11. Measurement of resistance of P.O. Box.
12. Determination of Velocity of sound by resonance column method.
13. To find the focal length of a convex lens by u-v method.
14. Potentio meter – To compare the emfs of two given cells.

**N.B. :** Sl. No.1 to Sl. No.8 are compulsory and any two experiments out of Sl. No.9 to Sl. No.14 will be conducted. In total 10 experiments will be conducted.

