Question Bank on Engineering Physics

Unit-1 :- Units & Dimensions

List of 2 marks questions :-

1. Write down the dimension of power.
2. Write the dimension of Gravitational Constant.
3. State principle of homogeneity.
4. Write down the unit of force and momentum.
5. Write down the unit and dimension of impulse and energy.
6. Write down the dimensions of pressure and angular velocity.
7. What is the SI unit of Planck's constant & heat ?
8. Write the dimension of the following :-
   (a) Wavelength (b) Kinetic energy (c) Surface tension
9. Write the dimension of the following :-
   (a) Electric current (b) Resistance (c) Capacitance
10. Write the SI units of the following
    (a) Work (b) Electric potential (c) Specific heat (d) Charge.

List of 5 marks questions :-

1. Check the accuracy of the relation $v^2 - u^2 = 2as$.
2. Check the correctness of the relation $F = G\frac{m_1 m_2}{d^2}$.
3. Check the correctness of the relation $T = 2\pi\sqrt{l/g}$
4. Write all the fundamental units with their notations.
5. Check the dimensional correctness of the relation
   $S = ut + \frac{1}{2}at^2$.
6. Check the correctness of the relation $v = u + at$.

** Question from unit & dimension can also come from the following physical quantity.

(1) potential energy (2) Latent heat (3) Acceleration (4) Charge
(5) Density (6) Moment of Inertia (7) Stress, strain, (8) Angular velocity

Unit-2 :- Scalars and Vectors

List of 2 marks questions:-

① Define Scalar and vector with examples.

② Define co-initial and co-planner vectors with examples.

③ Define parallel and antiparallel vectors.

④ Which of the following is a scalar quantity.

(a) Force (b) Momentum (c) Pressure (d) Displacement

⑤ Which of the following is a vector quantity.

(a) Acceleration (b) distance (c) speed (d) time.

⑥ If $\vec{A} \perp \vec{B}$, then the value of $\vec{A} \cdot \vec{B} =$ ——

⑦ Define equal vector & negative vector.

⑧ When $\vec{A} \parallel \vec{B}$, then the value of $\vec{A} \times \vec{B} =$ —— .

List of 5 marks questions :-

① If $\vec{A} = 2\hat{i} - \hat{j} + 7\hat{k}$ and $\vec{B} = 7\hat{j} - \hat{k}$, then find $\vec{A} \cdot \vec{B}$ and $\vec{A} \times \vec{B}$.

② Find the angle between two vectors given by, $\vec{A} = 2\hat{i} - \hat{j} + 3\hat{k}$, $\vec{B} = \hat{i} + \hat{j} - 7\hat{k}$

③ If the x-component of a force of 25N is 5N, then find its y-component using the concept of Resolution of vector.

④ If two forces of 5N & 10N at acting at an angle 120°. Then find the magnitude of their resultant.

⑤ If two vectors $\vec{A} = 2\hat{i} + 7\hat{j} + c\hat{k}$ and $\vec{B} = 2\hat{i} - \hat{j} + \hat{k}$ are perpendicular to each other, then find the value of 'c'?

⑥ State triangle / parallelogram law of vector addition.

Unit-3:- Kinematics

List of 2 marks questions:-

1. Explains the concept of rest and motion.
2. Define displacement and velocity.
3. Define force and find its dimension.
4. Define acceleration with its formula.
5. Write down the three equations of motion under gravity.
6. Define circular motion with example.
7. Define projectile, give two examples.

List of 5 marks questions:-

1. Find the length of the train running at the speed of 60 km/hr which crosses a pole in 9 seconds.
2. Derive the relation between linear velocity and angular velocity.
3. Derive the relation between linear acceleration & angular acceleration.
4. A train 200 metres long and travelling at a speed of 60 km/h in how many seconds did the train cross a bridge of 100 metres?

Long question (10 marks)

1. Find the expression for equation of trajectory, time of flight, maximum height, horizontal range and condition for maximum horizontal range for a projectile fired at an angle θ with horizontal?

Unit-4 :- Work & Friction

List of 2 marks questions :-

(1) Define work and its SI unit.

(2) Define friction and give any two examples about frictional forces acting between two objects.

(3) Define the coefficient of friction

(4) A 200 kg block rests on a plane whose coefficient of friction $\mu = 0.25$, Find the value of applied force.

(5) If the force of 50 N is applied on a block resting on a surface, which is 2 kg, Find the coefficient of friction μ.

List of 5 marks questions :-

(1) State the laws of limiting friction.

(2) Write down the types of friction and define them.

(3) Write any two methods of reducing friction with proper explanation.

Long question (10 marks) :-

(1) State the laws of limiting friction, and write down the methods to reduce friction, explain them exhaustively.

Unit-5 :- Gravitation

List of 2 marks questions :-

(1) Define universal gravitational constant.
(2) Define accelaration due to gravity (g).
(3) How the value of gravity 'g' varies with altitude and depth (only expression).

List of 5 marks questions :-

(1) State and explain newton's law of gravitation
(2) Derive the relation between accelaration due to to gravity (g) and universal gravitational constant (G).
(3) Distinguish between mass and weight.
(4) State keplers laws of planetary motion with proper diagram.

Unit-6 :- Oscillations & Waves

List of 2 marks questions :-

(1) Define simple harmonic motion with examples.
(2) Define wave motion and wave length.
(3) Define amplitude of a wave.
(4) Define frequency and time period of wave with their units (SI system).
(5) Derive the relation between velocity, frequency and wavelength of a wave.
(6) Define ultrasonic and give two applications.

*Unit-6 - continue....

List of 5 marks questions:-

(1) Find the expression for displacement, velocity & acceleration of a body executing SHM.
(2) Write the difference between Transverse and longitudinal wave motion.
(3) Write down the properties of ultrasonic wave.

Unit-7 :- Heat & Thermodynamics

List of 2 marks questions:-

(1) Define heat & temperature. What is the basic difference between them?
(2) What are the units of heat in various system of units (SI, MKS, CGS).
(3) Define the specific heat and find its dimension.
(4) Define latent heat, write its unit & dimension.
(5) Define coefficient of linear expansion (α).
(6) Define coefficient of superficial expansion (β).
(7) Define coefficient of cubical expansion (γ).
(8) Define Joule's mechanical equivalent of heat.
(9) Write the relation between work and heat.
(10) Define thermal expansion
(11) calculate the amount of heat required to rise the temperature of 1kg of iron block from 90°C to 120°C (Given specific heat of iron → 460 J/kg K.

* Unit-7 - Continue....

List of 5 marks questions:

(1) Derive the relation between α and β for a solid.

(2) Derive the relation between coefficient of linear(α) and cubical(γ) of a solid.

(3) Explain the concept of expansion of solid.

(4) State & explain first law of thermodynamics.

Long question (10 marks):-

(1) How much steam at 100°C will melt 3.2kg of ice at -10°C? Given that Specific heat of ice = 0.5 kcal/kg°C
Latent heat of steam = 540 kcal/kg
Latent heat of ice = 80 kcal/kg

(2) Define Joules mechanical equivalent of heat? Determine the specific heat of an unknown substance if a 2.50g sample releases 12 calories as its temperature changes from 25°C to 30°C.

(3) Define the coefficient of linear & cubical expansion of solids. Derive the relation between α, β & γ.

Where α = Coefficient of linear expansion of solid.
β = Coefficient of superficial expansion of solid.
γ = Coefficient of cubical expansion of solid.

Unit-8- Optics

List of 2 marks questions:-

(1) Define reflection with proper ray diagram.
(2) Define refraction with proper ray diagram.
(3) Define refractive index with its formula.
(4) Draw the ray diagram for refraction through prism.
(5) Define optical fibre, with two application.

List of 5 marks questions:-

(1) Define reflection with its laws of reflection.
(2) Define refraction & laws of refraction
(3) Define critical angle and total internal reflection.
(4) Define optical fibre and write down its properties.

Unit-9- Electrostatics & Magnetostatics

List of two marks questions:

(1) Define electrostatics.
(2) Define relative permittivity and its formula.
(3) Define absolute permittivity and its units.
(4) Define unit charge in electrostatics.
(5) Define electric potential & its formula with its unit.
(6) Define potential difference. How it is different from electric potential.
(7) Define electric field intensity, write its formula and units (SI).

* Unit-9 - Continue....

(8) Define capacitance of a capacitor. Give an expression for finding effective capacitance of series combination of capacitor

(9) If 2μF and 3μF are two capacitance of two capacitors connected in series, find their combined capacitances.

(10) Define unit pole in magnetostatics.

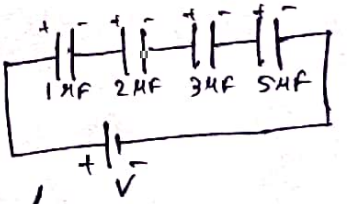
(11) Define magnetic field and magnetic field intensity, also provide their units.

(12) Define magnetic flux(Φ). At what condition the flux is maximum?

List of 5 marks question:-

(1) State and explain coulombs law in electrostatics.

(2) Find the combined capacitance for a circuit, when four capacitors of capacitance 1μF, 2μF, 3μF & 5μF are connected in series.



(3) Explain the properties of magnet.

(4) State coulomb's law in magnetism, hence define unit pole.

(5) Explain all the properties of magnetic lines of force.

Long Questions (10 marks):-

(1) Define magnetic flux. Find the magnitude of flux(Φ) at different conditions. Write & explain the properties of lines of force.

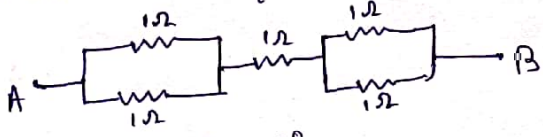
Unit-10 - Current electricity

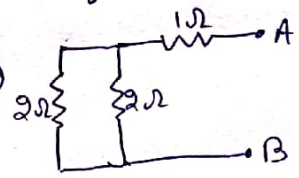
List of 2 marks questions :

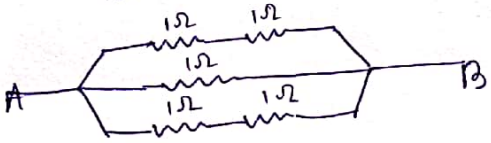
(1) Define electric current and write its unit (SI).
(2) Write the general expression for series and parallel combination of resistors.
(3) State ohm's law for electric circuit.
(4) Write any two application of ohm's law.

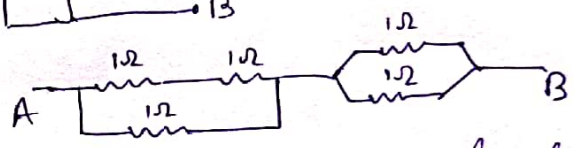
List of 5 marks questions :

(1) Find the equivalent resistance of the following :

(a) 

(b) 

(c) 

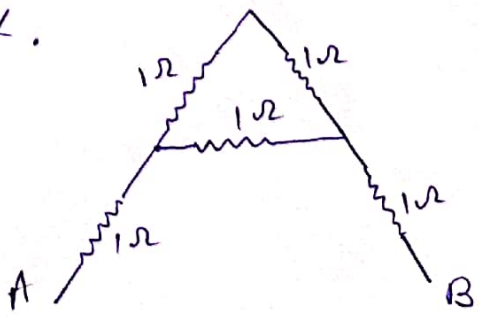
(d) 

Here each bit can a question of 5 marks, one has to find the Equivalent between the points A & B.

(2) State and explain kirchhoff's current law & voltage law with neat circuit diagram.
(3) State ohm's law & its application.

Long question (10 marks) :

(1) State kirchhoff's voltage law. Derive the condition of balance Wheatstone's bridge.
(2) State kirchhoff's current law. Find the equivalent resistance of the given circuit.



Unit-11 :- Electromagnetism & Electromagnetic Induction

List of 2 marks questions :-

(1) Define electromagnetism.
(2) Define Lenz's law.
(3) State fleming right hand rule..

List of 5 marks questions :-

(1) Write down the difference between Flemings Right hand rule and flemings left hand rule.
(2) State faraday's laws of electro magnetic Induction.

Long question (10 mark) :-

(1) Find the expression for force acting on a current carrying conductor placed on a uniform magnetic.

Unit - 12 :- Modern physics

List of 2 marks questions :-

(1) Define Laser and its full form.
(2) Write down the application of laser.
(3) Define Ground waves, Sky waves & Space waves.

List of 5 marks questions :-

(1) Explain the principle of laser.
(2) Write down the properties & application of laser.
(3) Define population inversion.