



Shree H.N. Shukla College of Science Rajkot

PHYSICS

F.Y.B.Sc. (Sem. I) (CBCS)

Preliminary examination

PAPER- 101

[Time: 2.30 hours]

[Total Marks: 70]

Date: __/__/__

Instructions: All questions are compulsory.
The right side figure indicates total marks of the question.
Draw the figure wherever necessary.
Write answers of all the questions in main answer sheets.

Q.1 (A) Answer the following questions. [4]

1. What is vectors?
2. Find $A \times B$, if $A=2i$ and $B= 3j$.
3. If the color bands on a resistor is green, orange, violet and gold respectively, what will be the value of resistor?
4. What is relation of a voltage source converted into current source?

Q.1 (B) Evaluate the numerical (Any one). [2]

1. The three edges of a parallelepiped are $i+2j+3k$, $5j$ and $4j+4k$ what should be the volume.
2. How long will it take for voltage to drop from 100v to 50v in a RC series circuit of time constant T sec.?

Q.1 (C) Answer the following question. (Any one) [3]

1. Explain practical current source.
2. Explain cross product of two vectors.

Q.1 (D) Answer the following question. (Any one) [5]

1. Explain vector triple product.
2. Show that in RC-circuit charge and current are the exponential function of time.

Q.2 (A) Answer the following questions. [4]

1. Define forbidden gap of energy band gap.
2. In absolute zero temperature semiconductor behaves as _____.
3. What is avalanche breakdown?
4. In N-type semiconductor minority charge carrier's is _____.

Q.2 (B) Answer the following question. (Any one) [2]

1. Draw the label diagram of Germanium crystal structure with arsenic impurity atom.
2. Discuss the effect of temperature on conductivity of intrinsic semiconductor.

Q.2 (C) Answer the following question. (Any one) [3]

1. Explain the formation of a PN-junction.
2. Classify the material based on energy band structure.

Q.2 (D) Answer the following question. (Any one) [5]

1. Explain the V-I characteristics of a PN junction diode.
2. Explain the V-I characteristics of a Zener diode.

Q.3 (A) Answer the following question. (Any one) [4]

1. Define conservative and non-conservative force.
2. Define elastic collisions.
3. Define coefficient of restitution.
4. State the Newton's second laws.

Q.3 (B) Evaluate the numerical. (Any one) [2]

1. How much power is require to carry a body of mass 100kg at a height of 60m in 1 Minute.
2. A body of mass 18 kg moves on a horizontal frictionless surface with a speed of 2m/s. If is brought to rest by compressing a spring in the path. How much is the Spring compressed if the forces constant of the springs is 0.2 kg/m. ($G=10\text{m/s}^2$)

Q.3 (C) Answer the following question. (Any one) [3]

1. State and prove work energy theorem.
2. State conservation of linear momentum and prove it.

Q.3 (D) Answer the following question. (Any one) [5]

1. Explain the Elastic collision in one dimension.
2. Explain the Rockets propulsion.

Q.4 (A) Answer the following question. [4]

1. Kepler's 3rd law is also known as law of _____.
2. The value of velocity of escape on the earth is _____ Km/s.
3. What is rotation motion?
4. Definition of torque and angular moment in vector form.

Q.4 (B) Evaluate the numerical. (Any one) [2]

1. If the mean distance of mass from the sun is 1.525 times that of the earth from the sun calculate the number of years in which mass will complete one revolution about the sun.
2. Due to the application of a torque on a body having moment of inertia of 50 Kgm². It's angular velocity changes from 3rad/s to 5 red/s find its rotational kinetic energy.

Q.4 (C) Answer the following question. (Any one) [3]

1. What is angular velocity? Prove the relation between liner velocity and angular velocity.
2. Prove the Kepler's second law of planetary motion.

Q.4 (D) Answer the following question. (Any one) [5]

1. State and prove the theorems of moment of inertia.
2. Derive the expression of gravitational potential at a point outside the sphere.

Q.5 (A) answer the following question. (Any one) [4]

1. What is elasticity?
2. Define the hook's law.
3. Define Amplitude.
4. Define the simple harmonic motion.

Q.5 (B) Evaluate the numerical (Any one) [2]

1. A particle of mass 10⁻²⁰ Kg executes simple harmonic motion with a period of 10⁻⁵s and a maximum velocity of 10³m/s find the maximum displacement.
2. A particle of mass 100g executes a simple harmonic motion, the restoring force is provided by a spring of spring constant 80 N/m find the time period.

Q.5 (C) Answer the following question. (Any one)

[3]

1. Write a name the moduli of elasticity. And explain the bulk modulus.
2. Explain Damped oscillation.

Q.5 (D) Answer the following question. (Any one)

[5]

1. Explain the Relation between longitudinal stress and longitudinal strain.
2. Drive the equation of motion of a simple harmonic motion.

ALL THE BEST