

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM-GOA
SEMESTER END EXAMINATION, JANUARY 2022**

Semester: *I*

Subject: *Generic Elective – Physics*

Subject Code: *PYG 101*

Name of the Paper: *Basic Physics*

Total marks: 80 **Date:** /01/2022 **Duration:** 2 Hours **Total No of pages:** 3

Instructions:

- 1) All questions are compulsory, however internal choice is available.
- 2) Figures to the right indicate maximum marks to the question.
- 3) Symbols have their usual meanings unless otherwise stated.
- 4) Draw neat diagram/circuit diagrams wherever necessary.
- 5) Use of non-programmable calculator is permitted.

Q.1 Answer ANY FOUR of the following.

(4 × 4 = 16)

- i) Write a short note on the International System of units.
- ii) State Lenz's law. What happens when a bar magnet is moved towards a loop?
- iii) Define viscosity. State some of its applications to life sciences.
- iv) State Ohm's law. When does a conducting device obey Ohm's law? Plot current I versus applied potential difference V when the device is a 1000Ω resistor.
- v) Enumerate the features that an auditorium should have for good acoustics.
- vi) What is a constant current source? Draw the symbolic representation of a practical current source. Explain the reason for putting an impedance in the representation.

Q.2 Answer ANY FOUR of the following.

(4 × 4 = 16)

- i) Distinguish between streamline and turbulent flow.
- ii) How are magnetic fields produced? Represent the field lines across a bar magnet.
- iii) State Coulomb's law. What is its importance?
- iv) Define 1 ampere, 1 volt and 1 ohm.
- v) Explain briefly the construction of a ceramic capacitor. What is the range of capacitance values available in ceramic capacitors?
- vi) State Sabine's formula for reverberation time. What is its significance?

Q.3 Answer the following.

- A) i) Mention the three ways in which a solid changes its dimensions when an external force acts on it. (3)
ii) State the Bernoulli's theorem and discuss the working of the venturimeter. (3)

OR

- A) i) Derive Euler's equation for an incompressible fluid. (3)
ii) State a few applications of elastic behaviour of materials. (3)
B) Give a brief review of the molecular theory of surface tension. (6)

Q.4 Answer the following.

- A) i) Write a short note on the Earth's magnetic field. (3)
ii) What is doppler effect? Obtain an expression for the apparent frequency when the source is at rest and the observer is in motion. (3)

OR

- A) i) Explain any three methods through which ultrasonic waves can be detected. (3)
ii) Two airplanes *A* and *B* are approaching each other with a speed of 360 km/hr . The frequency of the whistle emitted by *A* is 1000 Hz . Calculate the apparent pitch of the whistle as heard by the passengers of airplane *B*. Velocity of sound in air = 350 m/s . (3)
B) Describe a method of producing ultrasonic using the principle of magnetostriction. (6)

Q.5 Answer the following.

- A) Draw the block diagram of a transducer and explain each of its components. (3)
Distinguish between conductors, insulators and semiconductors based on their ability to move charge through them. Give examples. (3)

OR

- A) Consider an electron of mass m placed in an electric field of magnitude \vec{E} . Obtain an expression for the resistivity ρ of the material. (3)
On what basis are transducers classified? Discuss in detail. (3)

- B) Explain in detail the working of an light-emitting diode (LED). In what respect is an LED different from an ordinary PN-junction diode? State applications of LEDs. Why should you prefer LEDs over conventional incandescent lamps? (6)

Q.6 Answer the following.

- A) i) Sketch typical CE output characteristics for an NPN transistor. Label all variables. (3)
ii) Explain constructional features of a wire wound resistor. A resistor has a color band sequence: yellow, violet, orange and gold. What is its value? In what range will its resistance lie? (3)

OR

- A) i) Draw the circuit diagram of a half wave rectifier. Explain its working. (3)
ii) Show that the ripple factor of a half wave rectifier is 1.21 and maximum rectification efficiency is 40.6%. (3)
B) Explain in detail the formation of the depletion region across a PN junction without an external voltage. (6)