



HCW-003-001302

Seat No. _____

B. Sc. (Sem. III) (CBCS) Examination

October / November – 2017

Physics : Paper - 301

*(Thermodynamics, Electricity, Magnetism,
Electronics & Modern Physics.)*

(Old Course)

Faculty Code : 003

Subject Code : 001302

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :**
- (1) All questions are compulsory.
 - (2) Symbols have their usual meanings.
 - (3) Figures on the right side indicates full marks.
 - (4) Non-programmable scientific calculator is allowed.

- 1** Answer the following questions. Each question carry **20**
one mark :
- (1) Define flexural rigidity.
 - (2) Write stoke's formula relating the terminal velocity and viscous drag.
 - (3) Give the mathematical representation of the first law of thermodynamics.
 - (4) Define the thermal efficiency of a heat engine.
 - (5) What will be the change in entropy in a reversible process ?
 - (6) Write the expression for Stefan's law for a perfectly black body.
 - (7) State Wein's law of radiation.
 - (8) Write the expression for gauss's theorem.
 - (9) The potential energy of a capacitor having capacity C is _____.
 - (10) $\frac{N}{A.M.}$ is the units of _____.

- (11) Define magnetic susceptibility.
- (12) Why soft iron is used to manufacture the electromagnets ?
- (13) Name the types of theory of relativity.
- (14) Write the equation giving universal equivalence between mass and energy.
- (15) The mass and energy are two different forms of the same entity. True or False ?
- (16) What should be the ideal value of stability factor ?
- (17) Which transistor biasing method has smallest value of stability factor ?
- (18) What is the function of coupling capacitor in an RC-Coupled amplifier ?
- (19) Find the voltage gain of a transistor amplifier having $R_L = R_{in} = 1K\Omega$, $R_C = 2K\Omega$ and $\beta = 100$.
- (20) What will be the phase difference between input and output voltage of a CE amplifier ?

2 (A) Answer the following questions in short : (Any **Three**) **6**

- (1) Explain : Stress and Strain.
- (2) Explain : Streamline and Turbulent flow.
- (3) Write a note on heat engine.
- (4) Show that the entropy does not change in an adiabatic process.
- (5) Write any four properties of radiant heat.
- (6) Write the factors on which the capacity of a parallel plate capacitor depends.

(B) Answer the following questions in brief : (Any **Three**) **9**

- (1) Explain Reynold's number and give its significance.
- (2) Explain Newton's law of viscous flow and define co-efficient of viscosity.
- (3) Explain the workdone during expansion of a gas at constant pressure.
- (4) Write a note on entropy and disorder.
- (5) Explain energy distribution curve with important points.
- (6) Explain the potential energy of a capacitor.

(C) Answer the following questions in detail : (Any **Two**) **10**

- (1) Derive an expression for bending moment of the beam.
- (2) Derive an expression for work done by a gas during isothermal expansion.
- (3) Explain blackbody radiation and Stefan's law of black body.
- (4) State and prove Gauss's theorem.
- (5) Obtain the potential and electric field due to electric dipole.

3 (A) Answer the following questions in short : (Any **Three**) **6**

- (1) Explain magnetic flux.
- (2) Explain hall co-efficient and hall mobility.
- (3) Write a note on time dialation.
- (4) What is stabilization and why it is needed ?
- (5) Explain frequency response curve of an RC-Coupled CE amplifier.
- (6) Graphically explain the phase reversal in CE amplifier.

(B) Answer the following questions in brief : (Any **Three**) **9**

- (1) A magnetic field of 3.0×10^{-4} T balance a perpendicular electric field of 9 KV in their effect on an electron beam passing through the two fields in a direction perpendicular to both of them. Find the speed of electron.
- (2) Explain : Magnetic susceptibility, Magnetic permeability and relative magnetic permeability.
- (3) Obtain Galilean transformations.
- (4) Write and explain the fundamental postulates of special relativity.
- (5) Explain the inherent variations of transistor parameters.
- (6) Show that the output voltage of a single stage CE transistor amplifier is 180° out of phase with input voltage.

(C) Answer the following questions in detail : (Any **Two**) **10**

- (1) Explain energy loss due to hysteresis.
- (2) Write Einstein's velocity addition theorem and show that it is not possible to exceed the velocity of light.
- (3) Calculate the mass m and speed U of an electron having kinetic energy of 1 Mev.

$$[m_0 = 9.11 \times 10^{-31} \text{kg and } C = 3 \times 10^8 \text{m/s}]$$

- (4) Describe voltage divider bias method and obtain expression for its stability factor.
 - (5) Obtain d.c. and a.c. load lines.
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