JAH-003-001302 Seat No. _____

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

November - 2019

Physics - 301

(Old Course) *(Thermodynamics, Electricity, Magnetism, Electronics & Modern Physics)*

Faculty Code : 003
Subject Code : 001302

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Write answer of all quesitons in main answer book.
(2) All questions are compulsory.
(3) Symbols have their usual meaning.
(4) Figures on right hand sides indicate full marks.

SECTION - A

1 Choose the correct option from the following M.C.Q.s **20**

(1) The flexural rigidity (I_g) of the beam is
(a) YAK^2 (b) AK
(c) AK^2 (d) $hd/12$

(2) Hook's law essentially defines _____.
(a) stress (b) strain
(c) elastic limit (d) yield point

(3) Viscosity is also known as _____.
(a) solid friction (b) fluid friction
(c) surface tension (d) tension

(4) SI unit of work is _____.
(a) Joule (b) Calories
(c) Calories / Joule (d) Volume

(5) If the system absorbs heat, then Q is _____.
(a) negative (b) constant
(c) positive (d) does not change

(6) $C_p - C_V$ = _____
(a) P (b) γ
(c) T (d) R

(7) The radiant heat is _____ wave.
(a) electromagnetic (b) mechanical
(c) classical (d) magnetic

(8) The fastest mode of heat transfer is _____.
(a) Conduction (b) convection
(c) radiation (d) combustion

(9) The value of emissivity for the perfectly black body is _____.
(a) less than 1 (b) greater than 1
(c) 1 (d) 2

(10) If electric flux is negative, then the lines of force are _____.
(a) diverging (b) converging
(c) parallel (d) perpendicular

(11) 1 e.s.u. of potential = _____ volt.
(a) 1 (b) 0
(c) 745 (d) 300

(12) The unit of potential is _____.
(a) Joule/Coulomb (b) Volt/Coulomb
(c) Coulomb/Joule (d) Coulomb/Volt

(13) The relative permeability of a diamagnetic substance is _____
(a) very large
(b) small but greater than 1
(c) less than 1
(d) negative

(14) If the number of turns is doubled the self-inductance of a solenoid will become _____.
(a) 2 times (b) 4 times
(c) 1/2 times (d) 1/4 times

(15) Under the Galilean transformation, the linear momentum of a body is _____.
(a) variant (b) invariant
(c) increases (d) decreases

(16) The time dilation means to _____.
(a) shorten the time interval
(b) lengthen the time interval
(c) no change in the time interval
(d) fix the time interval

(17) The process of raising the strength of signal without any change in shape is known as _____.
(a) modulation (b) demodulation
(c) amplification (d) faithful amplification

(18) The operating point is also known as _____.
(a) out of point (b) saturation point
(c) knee point (d) quiescent point

(19) The phase difference between input voltage and output voltage of a CE amplifier is _____.

(a) 360° (b) 180°

(c) 270° (d) 90°

(20) The capacitors used in a transistor amplifier are _____.

(a) mica (b) paper

(c) air (d) electrolyte

SECTION - B

2 (a) Answer the following questions in short : (any **three**) **6**

(1) Define viscosity and coefficient of viscosity.

(2) Define : Stress and Strain

(3) Write Clausius statement for second law of thermodynamics.

(4) Derive change in entropy in adiabatic process.

(5) Define : Conduction

(6) Explain : Electric flux density

(b) Answer the following questions : (any **three**) **9**

(1) Explain the terms :

(i) Streamline flow

(ii) Turbulent flow.

(2) Define Stoke's law.

(3) Write a note on first law of thermodynamics.

(4) A black body having temperature 727°C with the total area of the surface 10 m^2, then how much heat energy can be emitted from the surface in half an hour ? $\sigma = 5.7 \times 10^{-8}\ W/m^2K^{-4}$

(5) Discuss : Absorbing power

(6) Define : Stefan's law

(c) Answer the following questions in detail : (any **two**) **10**

(1) Derive Poiseuille formula for the rate of flow of liquid through capillary tube.

(2) Derive the formula of work done by a gas during isothermal expansion.

(3) Derive the general expression for change in entropy of an ideal gas.

(4) From the Planck's distribution formula about a black body derive Wein's and Rayleigh-Jean's formula.

(5) State and prove Gauss's theorem.

3 (a) Answer the following questions in short : (any **three**) **6**

(1) Calculate self-inductance of solenoid.

(2) Write Newtonian Relativity.

(3) Write methods of transistor biasing.

(4) Explain frequency curve of an amplifier.

(5) Write a note on inertial reference frame.

(6) What do you understand by single stage transistor amplifier?

(b) Answer the following questions : (any **three**) **9**

(1) Write any six properties of paramagnetic substance.

(2) Establish the relation $\beta = \mu_0 [H + M]$.

(3) Explain mutual induction of solenoid.

(4) For the transistor amplifier having R_C = 2 kΩ, R_E = 1 kΩ, R_{in} = 1 KΩ, β = 80. Find the voltage gain.

(5) Describe a.c. load line.

(6) Drawing circuit of a practical single stage transistor amplifier. Explain function of each components.

(c) Answer the following questions in detail : (any **two**) **10**

(1) Explain Hall effect. Obtain the formula of Hall potential.

(2) What do you understand by d.c. load line? How will you construct them on output characteristics?

(3) Derive Lorentz transformation equations.

(4) Describe the voltage divider biased method along with stability factor.

(5) Explain phase reversal with graphical demonstration.
