VCD 6/10/2017 S.Y.B.Sc. (SEM III) TIME: 2½hr PHYSICS III Marks 7

Note : Numbers indicate in the right hand side are marks
All questions are compulsory.
Use of non programmable calculator is allowed.

Q. 1 : Answer the following questions. **20 marks**

A) Explain the construction and working of Otto Engine. (7m)

OR

A) What is the principal used in working of refrigerator & heat pump. (7m)

B) Calculate the work done in a Carnot's cycle of operation. Deduce efficiency of a Carnot's engine in terms of temperature between which it work. (8m)

OR

B) Derive the expression for efficiency of internal combustion engine (Diesel Engine) with suitable diagram. (8m)

C) Find the efficiency of carnot engine working between the steam point and the ice point. (5m)

OR

C) Distinguish between Otto engine and Diesel engine. (5m)

Q. 2 : Answer the following questions. **20 marks**

A) Show that during a reversible adiabatic processes the entropy of a system remains Constant. (7m)

OR

A) If 100gms of water at 0 ° C is mixed an equal mass of water at 80 ° C. Calculate the resultant increase in entropy. (7m)

B) Design an expression for entropy of an ideal gas in terms of its pressure, volume and specific heat. (8m)

OR

B) State and prove the principal of increase of entropy.

Calculate the increase in entropy when 1 gms of ice at -13°C is converted into steam at 100 ° C. (Given SP heat =0.5, Latent heat of ice =80Cal/gm, Latent heat of steam=540 Cal/gm.) (8m)

C) Write a short note on Zero Point Energy. (5m)

OR

C) Define entropy and write Physical Meaning of entropy. (5m)

P.T.O.

Q. 3 : Answer the following questions.

A) Write a short note on Magnetic Material.

OR

A) Derive the expression for interplaner spacing between plane in a cubic crystal with indices h, k and l.

B) Show that lattice constant for FCC is $4r / \sqrt{2}$ and Calculate its atomic packing fact

OR

B) Explain the general properties of metals.

C) Define : 1) Atomic radius 2) Basis 3) Co-ordination number
4) Space Lattice 5) Unit Cell.

OR

C) Find the Miller indices for the plane a, b and c whose intercepts on X, Y and Z axes and ∞

Q. 4 : Answer the following questions. (any 3)

A) Find efficiency of a Carnot engine working between 127°C & 27°C. It absorb 50 cal heat. How much heat is rejected?

B) Define the following :-
i) Isothermal Process ii) Adiabatic Process iii) Isochoric
iv) Isobaric Process v) Coefficient of performance

C) A 100 gms. of water is heated from 30°C to 70°C Calculate change in entropy.

D) Calculate the change in entropy on converting one mole of gas occupying 10 liters at 2×10^5 N/M^2 to occupying 30 liters at a pressure of 5×10^5 N/M^2 (given R= 8.45 J/mo & Cv=21 J/ mole Kelvin)

E) Draw the planes (101),(001) and (111) in a simple cube lattice.

F) Show that in a simple cubic lattice the separation between the successive lattice Planes (100), (110) and (111) are in the ratio 1:1 / $\sqrt{2}$:1 / $\sqrt{3}$.
