8. a) What is a transistor ?

   b) With a neat circuit diagram, explain the working of NPN transistor in CE mode as an amplifier.   **(1+7)**

PART – B

Solve **any five** of the following. **Each** problem carries **four** marks :   **(5×4=20)**

9. A star whose apparent magnitude is observed to be 15 has a parallax of 0.05″. Find the absolute magnitude and compare the luminosity with that of the Sun. (Absolute magnitude of sun $M_\ominus$ = 5).

10. If the luminosity of white dwarf is 0.015 $L_\ominus$ and its radius is 650 km, calculate its temperature.

11. Calculate the life time of a star of mass $5M_\ominus$ if the life time of sun is 12 billion years.

12. X-rays of wavelength 0.25 Å undergoes compton scattering from a carbon block. Calculate the wavelengths of scattered radiation at 60° and 180°.

13. Calculate Fermienergy in eV for silver at absolute zero temperature. Electron density of silver is 5.863×10^{28} m^{-3} and $m_e = 9.11 \times 10^{-31}$ kg.

14. Calculate the current produced in a small Ge plate of area 10^{-4} m^2 and of thickness 0.2×10^{-3} m. When a p.d. of 4V is applied across the faces. Given concentration of free electrons in Ge is 2×10^{19} m^{-3}, mobilities of electrons and holes are 0.36 m^2/V-S and 0.17 m^2/V-S respectively.

15. For a transistor in CE mode V_{CC} = 12 V and Re = 5KΩ, calculate the values of cut off and saturation points to draw dc load line.

16. The h-parameters of a transistor are h_{ie} = 2kΩ, h_{re} = 3×10^{-4}, h_{fe} = 60 and h_{oe} = 30×10^{-6} mho. Calculate the current gain and voltage gain. (R_S = 1kΩ and R_L = 2kΩ).