Unit — III
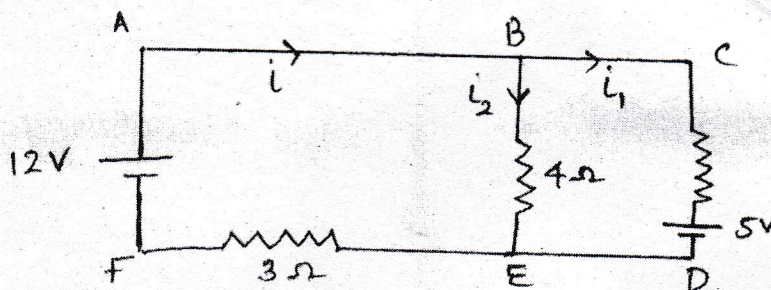
VII (a) Explain the principle of Shunt resistance.

3

(b) Describe a meter bridge. How it is used for the measurement of resistivity.

6

(c) Two cells of emf 12 V and 5 V and three resistances 2Ω, 3Ω and 4Ω are connected as Shown. Find the current i_1, i_2 and I using Kirchhoff's laws.

6

OR

VIII (a) Calculate the magnetic field due to a straight conductor of length 0.5m carrying a current of 3 A at a point equidistant from the ends of the conductor and 5 cm away from its centre.

3

(b) Describe with necessary theory, the construction and working of a moving coil galvanometer.

6

(c) How can a galvanometer be converted into a voltmeter ? A galvanometer having a resistance 50Ω gives full scale deflection for 10 mA. With what resistance connected in series, the galvanometer can be converted into a voltmeter of range 5V ?

6

Unit — IV

IX (a) Which are the main characteristics of laser radiation ?

3

(b) With the help of a neat diagram, explain the working of He-Ne laser.

6

(c) What is meant by pumping ? How this is achieved in solid and gas lasers ? Write down the main applications of lasers.

6

OR

X (a) The threshold frequency for initiating photoelectric effect in a metal is 5×10^{14} Hz. Calculate the frequency of radiation that should be incident on this metal to get electrons of kinetic energy 3.15×10^{-19} J.

3

(b) What are the essential components of a nuclear reactor ? Describe the functions of each component.

6

(c) A star derived its energy from the fusion of 4 protons to produce a helium nucleus and 2 positrons. Calculate the energy released in MeV if the masses of proton, helium and positron are respectively 1.00783u; 4.0026u and 0.00055u. Assume that 1u is equivalent to 931 MeV.

6