

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

ENGINEERING PHYSICS – II

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. What is meant by banking of roads ?
2. Derive the relation between angular momentum and rotational kinetic energy.
3. What is a Polar satellite ?
4. Distinguish between stimulated and spontaneous emission.
5. What is a moderator ?

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Derive an expression for the moment of inertia of a disc about  
(a) an axis passing through the centre and perpendicular to its plane.  
(b) about a diameter.
2. What is meant by centripetal Acceleration ? Derive its expression.
3. Discuss the variation of acceleration due to gravity 'g' with altitude.
4. State and explain Kirchhoff's Laws.
5. Derive an expression for the magnetic field at the centre of a current carrying coil.
6. Give Einstein's explanation of Photoelectric effect.
7. Discuss the various forms of energy sources.

(5×6 = 30)

PART — C

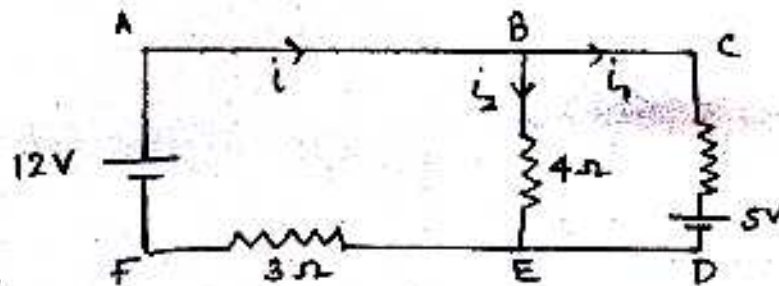
(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) The rotor of a motor has a moment of inertia  $15 \text{ kgm}^2$ . Calculate the torque required to increase its speed of rotation from 320 rpm to 600 rpm in 4 seconds. 3
- (b) Define radius of gyration. What is its SI unit ? What is its value for a uniform disc of mass M and radius R, if the disc is rotating about an axis passing through the centre and perpendicular to its plane. 6

- 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  $2\Omega$ ,  $3\Omega$  and  $4\Omega$  are connected as Shown. Find the current  $i_1$ ,  $i_2$  and  $I$  using Kirchoff'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  $50\Omega$  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  $5 \times 10^{14}$  Hz. Calculate the frequency of radiation that should be incident on this metal to get electrons of kinetic energy  $3.15 \times 10^{-19}$  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