

**B.Sc. (NAUTICAL SCIENCE)****Term-End Examination****June, 2008****BNA-013 : ELECTRICITY AND ELECTRONICS**

Time : 2 hours

Maximum Marks : 70

**Note :**

- (i) Use of calculator is allowed.
- (ii) Attempt total **three** questions from each section.
- (iii) Questions no. 1 and 5 are **compulsory**.
- (iv) In all you have to attempt **six** questions.

**SECTION A (Electricity)**

1. (a) Define active, reactive and apparent power in a single phase AC circuit and establish their inter-relationship using phaser diagram. 10
- (b) Explain KVL and KCL with the help of circuit diagram. 5
2. (a) Derive an expression for the magnetic field due to a straight solenoid carrying current. 5

- (b) If a coil of 200 turns is linked with a flux of 0.01 Wb when carrying a current of 10 Amp, calculate the inductance of the coil. Now, if current is uniformly reversed in 0.1 sec, calculate the induced emf. 5
3. (a) Explain the principle and working of an AC generator. 5
- (b) A 10 KVA, 500/250 V, 50 Hz, single phase transformer has a net area of cross section  $80 \text{ cm}^2$  and maximum flux density is  $1.2 \text{ Wb/m}^2$ . Calculate number of turns in primary and secondary. 5
4. (a) Write short notes on the following : 5
- (i) Moving Coil Galvanometer
- (ii) Effect of temperature on resistance
- (b) A basic meter movement with full scale deflection current of 1 mA and internal resistance of  $100 \Omega$  is to be converted into a (0-100) mA ammeter. Calculate the value of shunt resistance required. 5

## SECTION B (Electronics)

5. (a) Explain three basic configurations of transistor connections. Draw input and output characteristics of a Germanium NPN transistor in CE configuration. 10
- (b) A transistor has a current gain of 50. If the collector resistance is  $6\text{ k}\Omega$  and the input resistance is  $1\text{ k}\Omega$ , calculate the output voltage if input voltage is  $0.01\text{ V}$ . 5
6. (a) Define LED and explain its application in 7-segment display. 5
- (b) A half-wave rectifier is used to supply  $50\text{ V}$  d.c. to a load resistance of  $800\ \Omega$ . The forward resistance of diode is  $15\ \Omega$ . Calculate the rms value of a.c. voltage. 5
7. (a) What is frequency modulation ? How is it different from phase modulation ? 5
- (b) A piezo-electric crystal has the following parameters :  $L = 0.15\text{ H}$ ,  $C = 225\text{ pF}$ ,  $C_m = 770\text{ pF}$ , and  $R = 7.5\text{ k}\Omega$ . Find the series and parallel resonant frequencies. 5
8. (a) Explain Yagi antenna briefly. 5
- (b) What is skip distance ? Explain Geosynchronous Orbit Satellites. 5

