01420

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

December, 2010

BNA-013 : ELECTRICITY AND ELECTRONICS

Time : 2 hours *Maximum Marks : 70*

Note : *(i) Non-programmable scientific calculator is allowed.*

*(ii) Attempt **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) Explain principle, construction and working of transformer. What do you understand by step - up and step - down transformer ? Explain various types of losses in transformer. **10**

(b) A transformer has an efficiency of 80%. It delivers a current of 0.5 amp to a load of $220\,\Omega$. The number of turns in primary coil is 44 and the input voltage is 220 V. Calculate the number of turns in the secondary coil and input current. **5**

(Attempt any **TWO** from the following **THREE** questions).

2. (a) Define the following : 5

   (i) henry (ii) farad

   (iii) form factor (iv) watt

   (v) RMS value of A.C.

   (b) Two plates of a parallel plate capacitor are separated by a distance of 0.02m. A slab of dielectric constant 5 and thickness 0.01m is introduced between the plates with its faces parallel to them and the distance between the plates is so changed that capacitance of the capacitor remains unchanged. What is new distance between the plates ? 5

3. (a) Discuss combination of capacitors with one example. 5

   (b) Two cells of emf 5V and 10V having internal resistance 1Ω and 2Ω respectively are connected in parallel. This combination is connected in parallel with a resistance of 6Ω. Find the potential difference across 6Ω resistor. 5

4. (a) Define electrical power in A.C. circuit and explain physical significance of " Power Factor". 5

   (b) Two inductors of 20 mH and 25 mH have the coefficient of coupling 90%. Determine the effective inductances of various possible connections. 5

SECTION - B

(Electronics)

5. (a) What is modulation ? Why do we need modulation ? Compare frequency modulation and phase modulation 10

(b) The collector supply voltage in a common emitter amplifier is 10V. The voltage drop across the load resistance of 1.2kΩ is 1.2V. If α of the transistor is 0.93, determine 5

(i) Collector to emitter voltage

(ii) Base current

(Attempt **any two** from the following Three questions).

6. (a) Define α and β current gains of a transistor. Determine the relationship between them. 5

(b) An AM wave is represented by the expression 5

$V=65\ (1+0.7\cos 1400t)\sin 35.5\times 10^4\ t$ volts

(i) What are the maximum and minimum amplitudes of the A.M. wave ?

(ii) What frequency components are contained in the modulated wave ?

7. (a) Explain the working of a super - heterodyne receiver with necessary block diagram 5

(b) A tuned collector oscillator operates at 3.2 MHz frequency. At what frequency will it work if its tuned circuit capacitance is reduced by 30% ? 5

8. Write short notes on any Two of the following : 5+5

(a) LC tank circuit

(b) Ground waves and sky waves

(c) RADAR Antenna