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B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2011

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) What do you mean by an ideal ammeter and an ideal voltmeter ? How do you convert given galvanometer into an ammeter and a voltmeter ? Explain with necessary circuit diagram. **10**

   (b) A galvanometer of resistance 125 Ω has 100 divisions. When a potential difference of 30 mV is applied to its terminals it deflects by 10 divisions. How can it be converted into a voltmeter to read 250 volts ? **5**

(Attempt *any two* from the following *three* questions)

2. (a) Define :   5
        (i)   Temp. coefficient of resistance.
        (ii)   Farad
        (iii) Power factor
        (iv)   Coefficient of coupling
        (v)   Emf

    (b) A battery is made up from three similar   5
         correctly connected dry cells. The open
         circuit emf is measured to be 4.3 V. When
         the battery is connected to an unknown
         resister the current is measured to be
         0.4 amp and the battery terminal voltage as
         4.23 V. If one of the cells of the battery is
         reversed and the circuit made up as before,
         estimate the new current value.

3. (a) With the help of a neat diagram explain   5
         construction and working of a d.c.
         generator.

    (b) A coil of copper wire has a resistance of $30\,\Omega$ 5
         at 25° C and is connected to a 230 V supply.
         By how much must the voltage be increased
         to keep the current constant , if the
         temperature of the coil rises to 80° C ? Take
         the temperature coefficient of resistance of
         copper as $0.00\ 4^{\circ}/$C.

4. (a) What do you mean by inductance ? 5
Distanguish between Self inductance and
Mutual inductance.

(b) A step - down transformer converts voltage
of 2200 V into 220 V in the transmission line. 5
Number of turns in primary coil is 5000.
Efficiency of the transformer is 90% and its
output power is 8 kW. Calculate :

(i) Number of turns in the secondary coil.

(ii) Input power.

SECTION - B
(Electronics)

5. (a) What is demodulation ? Explain AM diode **10** detector with simple circuit diagram.

   (b) The carrier and modulating frequencies of **5** an FM transmitter are 1250 kHz and 12 kHz respectively. If the maximum frequency deviation is 40 kHz find modulation index, bandwidth, first three upper and lower side band frequencies.

(Attempt *any two* from the following *three* questions)

6. (a) Explain input and output characteristics of **5** transistor in CE configuration.

   (b) Find the value of α if $\beta = 50$. Also calculate **5** the emitter current if the base current is 25 μA.

7. (a) Explain Yagi antenna briefly. **5**

   (b) In a certain LC tank circuit the inductance **5** is 4 mH and the capacitance is 350 pF. Determine the resonate frequency.

8. Write short notes on *any two* of the following. **2x5=10**

   (a) Frequency Modulation.

   (b) Damped and Undamped Oscillations.

   (c) Photo - transistor.