00131

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

December, 2013

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.**

SECTION-A
(Electricity)

1.   (a)   Explain with neat sketch principle,   **10**
construction and working of 3- phase
Induction motor.

(b)   A single-phase transformer has 525 primary   **5**
turns and 70 secondary turns. If the
primary is connected to a 3300 Volt supply,
find the secondary voltage. Neglecting
losses, what is the primary current when
the secondary current is 250A ?

2.   (a)   Define the following terms :   **5**
(i)   Electric current
(ii)   E.M.F
(iii)   Power factor
(iv)   Power
(v)   Energy

(b) Deduce the formulae when two coils are connected in series such that their fluxes are additive. **5**

3. (a) Differentiate between core type and shell type transformer. **5**

   (b) A moving coil voltmeter reading up to 20 milli volts has a resistance of 2 ohms. How this instrument be adopted to read voltage upto 300 Volts ? **5**

4. (a) Explain the effect of temperature on resistance of pure metals, alloys and insulators. **5**

   (b) Calculate the inductance of a toroid, 25cm mean diameter and 6.25 cm^2 circular cross-section wound uniformaly with 1000 turns of wire. Calculate the e.m.f induced when current in it increases at the rate of 100A/second. **5**

SECTION–B
(Electronics)

5. (a) Explain amplitude modulation (AM). Derive the voltage equation of an AM wave. **10**

   (b) Discuss steps involved in demodulation of an FM wave. Explain working of FM demodulation with the help of a circuit diagram. **5**

6. (a) Describe transistor load line analysis. What is its importance? **5**

   (b) In a common base connection, $\alpha = 0.95$. The voltage drop across 2 kΩ resistance which is connected in the collector is 2V. Find the base current. **5**

7. (a) Derive an expression for the voltage gain of   5
         a transistor amplifier from its a.c. equivalent
         circuit.

    (b) An amplifier has an open circuit voltage   5
         gain of 1000, an input resistance of $2k\Omega$ and
         an output resistance of $1\ k\Omega$. Determine the
         input signal voltage required to produce an
         output signal current of 0.5A in 4Ω resistor
         connected across the output terminals.

8. Write short notes on **any two** of the following :
    (a) 7-segment display   2x5=10
    (b) LC tank circuit
    (c) Frequency modulation

––––––––––