

00107

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 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) With the help of a neat diagram explain the principle, construction and working of D.C. generator. **10**
- (b) Calculate the current drawn by the primary of a transformer, which steps down 220 V (input) to 12 V (output) to operate a load of resistance 8Ω . Assume the efficiency of the transformer to be 80% and input pf as 0.9. **5**

Attempt *any two* from the following three questions :

2. (a) Define : 5
- (i) Temperature coefficient of resistance.
 - (ii) Henry
 - (iii) Farad
 - (iv) Form factor
 - (v) Phase of a.c.
- (b) The capacitances of three capacitors are in the ratio 1 : 2 : 3. Their equivalent capacitance in parallel is greater than their equivalent capacitance in series by $60/11 \mu\text{F}$. Calculate their individual capacitances. 5
3. (a) How do you convert a given galvanometer into an ammeter ? Explain with necessary circuit diagram. 5
- (b) The maximum magnetic flux density in a 220 V - 12 V, 50 Hz transformer is 1.5 wb/m^2 . If the voltage drop per turn is 6.5 V, determine the primary and secondary turns. Also determine the area of cross section of the core. 5

4. Write short notes on *any two* of the following : 5+5

(a) Heating effect of electric current

(b) Active and Reactive power

(c) Magnetic field due to a straight solenoid carrying current

SECTION - B (Electronics)

5. (a) What is modulation ? Why do we need modulation ? Define modulation factor, side band frequencies and bandwidth in case of amplitude modulation. 10
- (b) An amplitude modulated wave is represented by the expression 5
- $$V = 70 (1 + 0.4 \cos 1550 t) \sin 35 \times 10^5 f \text{ volts}$$
- (i) What is the maximum and minimum amplitudes of A.M. wave ?
- (ii) What frequency components are contained in the modulated wave ?

Attempt *any two* from the following three questions :

6. (a) What is Piezo-electric effect ? Why Piezo-electric crystal is used in transistor oscillator ? 5
- (b) The resonant circuit of a tuned oscillator has a resonant frequency of 1.6 MHz. If the value of the inductance is 2 mH, determine the value of the capacitance required. 5

7. (a) Explain the working of a super - heterodyne receiver with necessary block diagram. 5
- (b) The input resistance of a transistor is 665Ω . Its base current is changed by $15 \mu\text{A}$, which results in change in collector current by 2 mA . This transistor is used as common emitter amplifier with a load resistance of $5 \text{ k}\Omega$. Calculate :
- (i) Current gain and
- (ii) Voltage gain of the amplifier.
8. Write short notes on *any two* of the following : 5+5
- (a) Photo transistor
- (b) Temperature transducer
- (c) Loop antenna
-