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B.Sc. (NAUTICAL SCIENCE)**Term-End Examination****December, 2011****BNA-013 : ELECTRICITY AND ELECTRONICS***Time : 2 hours**Maximum Marks : 70*

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- Note :** (i) *Non - programmable scientific calculator is allowed.*
(ii) *Attempt **three** questions from each section.*
(iii) *Questions No. 1 and 5 are compulsory.*
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SECTION - A**(Electricity)**

1. (a) Name the main parts of d.c. generator. **10**
Explain with neat sketch the function of each part of d.c. generator.
- (b) A single phase 50 Hz, 230/115 volts, 1-kVA **5**
transformer is loaded fully. Find its full load primary and secondary currents. Also find the currents at half the full-load.
2. (a) Define the following terms : **4x1¼=5**
(i) Active power
(ii) Reactive power
(iii) Apparent power
(iv) Power factor

- (b) Two capacitors of $2\ \mu\text{F}$ and $4\ \mu\text{F}$ respectively are connected in series. A p.d. of $900\ \text{V}$ is applied between the extreme terminals. Find the p.d. across each capacitor. 5
3. (a) Explain principle and working of a moving coil galvanometer. 5
- (b) If a coil of 150 turns is linked with a flux of $0.01\ \text{Wb}$ when carrying current of $10\ \text{A}$, calculate the inductance of coil. Now, if current is uniformly reversed in $0.1\ \text{sec}$, calculate the induced emf. 5
4. (a) State and explain Kirchhoff's Laws. 5
- (b) A platinum coil has a resistance of $3.146\ \Omega$ at $40^\circ\ \text{C}$ and $3.767\ \Omega$ at 100°C . Find the resistance at 0°C and the temperature coefficient of resistance at 40°C . 5

SECTION - B

(Electronics)

5. (a) Explain working of a radio receiver with block diagram. 10
- (b) The antenna current of an AM broadcast transmitter, modulated to a depth of 40% by an audio sine wave is 11A. It increases to 12A as a result of simultaneous modulation by another audio sine wave. What is modulation index due to this second wave ? 5
6. (a) Explain briefly common emitter amplifier with necessary circuit diagram. 5
- (b) For a single stage transistor amplifier, the collector load is $R_c = 2K\Omega$ and the input resistance $R_i = 1 K\Omega$. If the current gain is 50, calculate the voltage gain of the amplifier. 5
7. (a) Explain briefly 7 - segment display. 5
- (b) A certain transmitter radiates 9 kW with the carrier unmodulated and 10.125 kW when the carrier is sinusoidally modulated. Calculate the modulation index, percent of modulation. If another sine wave, corresponding to 40% modulation is transmitted simultaneously, determine total radiated power. 5

8. Write short notes on *any two* of the following : 2x5=10
- (a) LC tank circuit
 - (b) Sensors and transducers
 - (c) RADAR Antenna.
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