

Registration No. :

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Total number of printed pages – 4

B. Tech
BE 2102

Special Examination – 2012

BASIC ELECTRICAL ENGINEERING

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

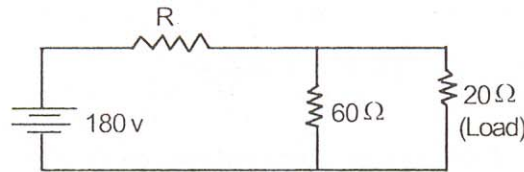
1. Answer the following questions : 2×10
- (a) Define specific resistance.
 - (b) Explain the characteristic of a controlled voltage source.
 - (c) What is the significance of Form factor and power factor ?
 - (d) Two impedances of $0.25 \angle -30^\circ$ & $5 + j6 \Omega$ are connected in parallel .Find out the resultant impedances in rectangular form ?
 - (e) A series R-L circuit having resistance of 20 ohm and inductance of 0.5 Henry is energized by a 200V DC Supply. What is the time constant for the R-L circuit ?
 - (f) Define magneto motive force.
 - (g) What is back emf in a DC motor ? write the expression for it and also Explain each term.
 - (h) What are the various type of cores used in a transformer and why they are laminated ?
 - (i) What is 'Synchronous speed' ? Find the frequency of the induced emf of an alternator having six pole rotating at 1500 rpm ?

P.T.O.

(j) Write down the emf equation of a DC generator explaining each term associated with it.

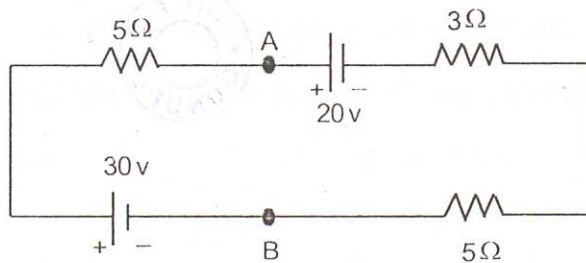
2. (a) Explain the characteristics of Open and Short circuit in electrical network by drawing a circuit diagram. 4

(b) In the circuit given below in Fig (1) Find the Value of R . So that the load 20Ω should draw the maximum power? Also find the Value of maximum power drawn by the load? 6



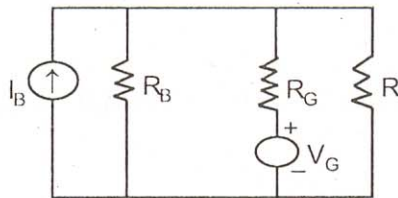
Fig(1)

3. (a) Applying KVL find the voltage between points X and Y of the circuit given Fig (2) below : 4



Fig(2)

(b) Find the Voltage across the resistance R in the circuit given Fig (3) below using Principle of Superposition : $I_B = 12A$, $R_B = 1\Omega$, $V_G = 12V$, $R_G = 0.3\Omega$ and $R = 23\Omega$. 6



Fig(3)

4. (a) Draw the analogy between electric circuits and magnetic circuits. 4
- (b) A cast steel ring of mean diameter 16cm has a cross section of 0.5 cm^2 . It has a saw cut 2mm wide at one place. Magnetization characteristic of the material is given below. Calculate how many ampere-turns are required to produce a flux of 0.065mWb in the ring, considering the leakage factor 1.2.

6

B (Tesla)	1.0	1.25	1.46	1.6
μ_r	714.3	521	365	246.2

5. (a) A capacitor is charged from a DC supply of 200V through a resistor in series having a resistance of 100Ω . If the time constant for the given set up is 15 ms, Calculate the value of the capacitance. Also calculate the time requirement for the capacitor to acquire 85% of the steady state charge assuming zero initial charge on the capacitor. 4
- (b) A balanced star connected load has resistance of 10Ω and inductance of 50mH per phase is connected to a three phase supply of 440V and 50Hz. Find the
- (i) Line Current.
- (ii) Phase current
- (iii) Power Factor
- (iv) Active power and reactive power consumed by the network 6
6. (a) A single phase 50Hz transformer has 400 turns on the primary and 800 turns on the secondary. The primary voltage is 400V and the cross section area of the core is 75 cm^2 . Determine the emf induced in the secondary and maximum value of the flux density. 4
- (b) A lamp rated 500W and 100V is connected in series with a capacitor across 250V, 50 Hz supply. Determine the value of the capacitance. 6
7. (a) Explain in brief various losses occurred in a DC machine. 3

(b) A 4 pole 450 KW, 4.6 kV DC shunt generator has armature and field resistances of $2\ \Omega$ and $333\ \Omega$ respectively. The generator is operating at rated speed of 3600 rpm. Find the no load voltage of the generator and terminal voltage at half load. 4

(c) A 220/20V transformer has 50 turns on its low voltage side. Calculate

(i) The number of turns on the high voltage side

(ii) The turn ratio when it is used as step down transformer

(iii) The turn ratio when it is used as step up transformer 3

8. Write short notes on any **two** : 5×2

(a) Voltage sources and Current Sources

(b) AC power distribution

(c) Signal Conditioning

(d) Rotating Magnetics Fields