Total No. of Questions – [4] Total No. of Printed Pages 3

G.R. No.	

OCTOBER 2017 / IN - SEM (T2)

F. Y. B.TECH. (COMMON) (SEMESTER - I)

COURSE NAME : BASIC ELECTRICAL ENGINEERING

(2017 PATTERN)

Solution and scheme of marking

Time : [1 Hour] [Max. Marks : 30]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4**
2) **Figures to the right indicate full marks.**

Q 1) a) Phasor diagram (any one line current/ all three line currents) 03M

Derivation steps for relation between line and phase current with correct relation 02M

$I_L = \sqrt{3}\ I_{ph}$ 01M

b) Derivation step of active power consumed by delta connected load in terms of line quantities 01M

$P_{active} = \sqrt{3}\ V_L\ I_L\ \cos \Phi_{ph}$ 01M

Derivation step of reactive power consumed by delta connected load in terms of line quantities 01M

$P_{reactive} = \sqrt{3}\ V_L\ I_L\ \sin \Phi_{ph}$ 01M

c) Line voltage $V_L = 400$ V 01M

Phase voltage $V_{ph} = 230.94$ V = 231 V 01M

p.f. = $\cos \Phi_{ph} = 0.8$ lag 01M

$I_L = I_{ph} = 23.09 = 23.1$ A 01M

$P_{active} = 12.8$ kW 01M

$P_{reactive} = 9.6$ kVAr 01 M

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OR

Q4) a) Note on autotransformer

Circuit diagram (for step up or step down) with proper notation of currents and voltages and primary and secondary sides 02M

Advantages of autotransformer Any two 02M

Disadvantages of autotransformer Any one 01M

Application of autotransformer Any one 01M

b) $E_1 = V_1 = 500$ V

$N_1 = 500$ $N_2 = 1200$

$a_c = 80\ cm^2 = 80 \times 10^{-4}\ m^2$ $f = 50$ Hz

$E_1 = 4.44 f \emptyset_m N_1 = 4.44\ f\ B_m\ a_c\ N_1$ $B_m = E_1 / 4.44\ f\ a_c\ N_1$

$B_m = 0.5630$ Wb 02M

$E_2 = 4.44\ f\ B_m\ a_c\ N_2 = 1199.86 = 1200$ V 02M

c) KVA rating = 5

$I_1 = 5000/500 = 10$ A 01M

$I_2 = 5000/1200 = 4.166$ A 01M

$a_c = 80\ cm^2 = 80 \times 10^{-4}\ m^2$ $f = 60$ Hz

$E_1 = V_1 = 500$ V

$E_1 = 4.44 f \emptyset_m N_1 = 4.44\ f\ B_m\ a_c\ N_1$ Therefore, $B_m = E_1 / 4.44\ f\ a_c\ N_1$

$B_m = 0.4692$ Wb 02M