set 2 solution

Total No. of Questions – [5] Total No. of Printed Pages 03

G.R. No.	

Paper Code - U127-104B (ESE)

May 2018 / END - SEM

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

COURSE NAME : BASIC ELECTRICAL ENGINEERING

(2017 PATTERN)

Solution and scheme of marking

Time : [1 Hour] [Max. Marks : 50]

(*) 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) $P = 8$, Wave $A = 2$, D.C. shunt motor, $Z = 400$

$I_{line} = 12A$, $I_f = I_{sh} = 2A$, ϕ/pole $= 0.05$ wb

$E_b = 200V$, $T_a = ?$ $N = ?$

$E_b = \frac{\phi PNZ}{60A}$ $\quad 200 = \frac{(0.05)(8)(N)(400)}{(60)(2)}$ $\quad \therefore$ **$N = 150$ r.p.m.** (02M)

$I_{line} = I_a + I_f$ $\quad \therefore I_a = I_{line} - I_f$ $\quad \therefore$ **$I_a = 12 - 2 = 10A$** (02M)

$T_a = \frac{1}{2\pi} \frac{PZ}{A} \phi I_a$ $\quad$ **$T_a = 127.32$** N-m ——— (02M)

b) 3 graphs – 01M each
Explanation of characteristics – 01M each

c) Function of both – 01M each

Material of both – 01M each

OR

Q2) a) Correct Derivation steps – 04M

Correct formula – 02M

Wave $A = 2$

b) D.C. shunt Gene., $P = 4$, $Z = 600$, $N = 1200$ rpm

ϕ/pole $= 6$ m wb $= 6 \times 10^{-3}$ wb ① $E_g = ?$

② if lap connected then $A = P = 4$

$N = ?$ if E_g is same in ①

① $\Rightarrow$ $E_g = \dfrac{\phi P N Z}{60 A} = \dfrac{(6\times10^{-3})(4)(1200)(600)}{60(2)} = 144\ V$

$\therefore$ $\boxed{E_g = 144\ V}$ ——— (03M)

② $\Rightarrow$ if $E_g = 144\ V$ & lap $A = P = 4$

$E_g = \dfrac{\phi P N Z}{60 A}$ $\quad 144 = \dfrac{(6\times10^{-3})(4)(N)(600)}{(60)(4)}$

$\therefore$ $\boxed{N = 2400\ r.p.m}$ ——— (03M)

c) Two application of each – 01M for each application

Q3) a) $P = 6$, 3-ϕ sq. cage I.M., $V = 400\ V$

$f = 50$ Hz

(i) $N_s = \dfrac{120 f}{P} = \dfrac{120(50)}{6} = 1000\ r.p.m.$ ——— (01M)

(ii) $N = ?$ $\quad S = 0.04$ $\quad N = N_s(1-S) = 960\ r.p.m.$ ——— (01M)

(iii) $f_r = ?$ $\quad S = 0.03$ $\quad f_r = S f = (0.03)(50) = 1.5$ Hz

——— (01M)

(iv) $f_r = ?$ at standstill $\quad S = 1$

$f_r = S f = (1)(50) = 50$ Hz ——— (01M)

b) Two application of each – 01M for each application

c) i) & ii)) point – 02M each

iii) & iv) point – 01M each

OR

Q4) a) $P = 4$, $V = 415V$, $f = 50Hz$

(i) $N_S = \frac{120f}{P} = 1500$ r.p.m. —— (01M)

(ii) $N = 2$ $S = 8\%$

$N = N_S(1 - S) = 1500(1 - 0.08) = 1380$ —— (01M)

(iii) if $N = 1200$ r.p.m. $\%S = 2$ $f_2 = 2$.

$\%S = \frac{N_S - N}{N_S} \times 100 = \frac{1500 - 1200}{1500} \times 100 = 20\%$ —— (01M)

(iv) $f_2 = Sf = (0.20)(50) = 10$ Hz —— (01M)

b) Characteristic – 02M

Both torque – 01M for each

c) 02M for each question's answer

Q.5

a – iii

b – ii

c – iii

d – i

e – iv

f – iv

g – ii

h – ii

i – iii

j - iii