2007 (A)

Time : 3 Hrs.

D1G

E & EC Engg.

Full Marks : 80
Pass Marks : 26

Answer from all three groups as per direction given in each case in own words.

lHkh rhu xik d iR;d xi e fn; x; fun'k d
vu lkj ç'uk d mÙkj viu 'kCnk e nA

The figures in right hand margin indicate full marks.

ik'o d vd i.kkd d lpd gA

GROUP-A

1. Choose correct answer from multiple choice answer: **1x20=20**

vud rFkk fofo/k mÙkjk e l lgh mÙkj dk p;u dj &

(i) Current carried by each of the two long parallel conductors is doubled. If their separation is also doubled, force between them would

(a) remain the same (b) increase two fold

(c) increase four fold (d) become half.

P.T.O.

/kkjk;Dr nk lekukUrj pkydk dh /kkjk iR;d pkyd e nxuh dj nh tk; ,o nk lekukUrj pkydk d chp dh njh Hkh nxuh dj nh tk; rk mud chp cy &

(a) ogh jgxk (b) nxuk gk tk,xk

(c) pkxuk gk tk,xk (d) vk/kk gk tk,xkA

(ii) The directon of induced e.m.f. can be found by

(a) Fleming's right hand rule

(b) Fleming's Left hand rule

(c) Kirchoff's voltage law

(d) Laplace's law.

ifjr fo|r okgd cy dh fn'kk ikIr dh tk ldrh g &

(a) ¶yfex d nkfgu gLr fu;e l

(b) ¶yfex d ck, gLr fu;e l

(c) fdjpkQ d okYVt fu;e l

(d) yiykl d fu;e lA

(iii) Higher the self-inductance of a coil,

(a) lower the e.m.f. induced in it.

(b) longer the delay is establishing steady current through it.

(c) greater the flux produced by it.

(d) lesser its weber-turns.

,d d.Myh dk Lo&ijdRo vf/kd gkxk tcfd

(a) ble ifjr fo|r okgd cy de gk

(b) bld }kjk fLFkj /kkjk LFkkfir dju e vf/kd nj gk

(c) bld }kjk vf/kd QyDl ink gk

(d) bldk ooj&yiV de gkA

(iv) Moving-iron istruments can be used for measuring

(a) direct currents and voltages

(b) alternating currents and voltages

(c) radio frequency currents

(d) both (a) and (b).

ykg pyu mi;=k dk 0;ogkj &

(a) fn"V /kkjkvk ,o okYVtk dk ekiu d fy, fd;k tk ldrk gA

(b) iR;korh /kkjkvk ,o okYVtk dk ekiu d fy, fd;k tk ldrk gA

(c) jfM;k vkofr /kkjkvk dk ekiu d fy, fd;k tk ldrk gA

(d) (a) vkj (b) nkuk dk ekiu d fy, fd;k tk ldrk gA

P.T.O.

(v) The KWh metre can be classified as a / an ..... instrument.

(a) deflecting (b) digital

(c) recording (d) indicating.

fdyk okV ?kVk eh Vj dk oxhdj.k ,d ..... mi;qDr= d tlk fd;k tk ldrk gA

(a) fo{kfir (b) fMftVy

(c) fjdkfMx (d) bfMdfVxA

(vi) If $e_1 = A \sin \omega t$ and $e_2 = B\sin(\omega t - \theta)$, then

(a) e_1 lags e_2 by θ (b) e_2 lags e_1 by θ

(c) e_2 leads e_1 by θ (d) e_1 leads e_2 by θ

;fn $e_1 = A \sin \omega t$,oa $e_2 = B\sin(\omega t - \theta)$ gk rk

(a) e_1, e_2 ls θ i'pxkeh g

(b) e_2, e_1 ls θ i'pxkeh g

(c) e_2, e_1 ls θ vxxkeh g

(d) e_1, e_2 ls θ vxxkeh gA

(vii) A resultant current is made of two components : a 10 Amp. d.c. component and a sinusoidal component of maximum value 14.14 Amp. The Average value of the resultant current is ..... Amperes.

,d ifj.kkeh /kkjk nks vo;oksa ls cuh gS ,d 10 vkEih;j fn"V /kkjk vo;o vkSj ,d vf/kdre eku 14.14 vkEih;j dk fluqlkW;kMy vo;o] rks ifj.kkeh /kkjk dk vkSlr eku ..... vkEih;j gksxkA

(a) 0 (b) 24.14

(c) 10 (d) 100

(viii) An A.C. current is given by $i = 100 \sin 100$. It will achieve a value of 50 Amp after ..... second.

,d iR;korhZ /kkjk $i = 100 \sin 100$ }kjk n'kkZ;h x;h gA ;g 50 vkEih;j dk eku ..... lsd.M d ckn izkIr djxhA

(a) 1/600 (b) 1/300

(c) 1/1800 (d) 1/900

P.T.O.

(ix) The voltage applied across an R-L circuit is equal to ..... of V_R and V_L.

(a) arithmetic sum (b) algebric sum

(c) phasor sum (d) sum of the squares.

,d R-L ifjiFk e ykx fd;k x;k okYVt dk eku ..... V_R vkj V_L d cjkcj gkxkA

(a) vdxf.krh; tkM

(b) chtxf.krh; tkM

(c) Qtj tkM

(d) oxk dk tkMA

(x) In a series R-C circuit

(a) Current and voltage are in phase

(b) Current leads with voltage

(c) Current lags with voltage

(d) Current leads by 90º with voltage.

,d J.kh Øe R-C ifjiFk e &

(a) /kkjk ,o okYVt nkuk ,d Qt e gkr gA

(b) /kkjk] okYVt l vxxkeh gA

(c) /kkjk] okYVt l i'pxkeh gA

(d) /kkjk] okYVt l 90º vxxkeh gA

(xi) The power factor of pure capacitance circuit will be

(a) One (b) Zero

(c) Infinite (d) None of these.

'k) l/kkfj= ifjiFk dk 'kfDr x.kkd gkxk &

(a) ,d (b) 'kU;

(c) vuUr (b) bue l dkb ughA

(xii) An ideal transformer is one which has

(a) a common core for its primary and secondary windings.

(b) no losses and magnetic leakage.

(c) core of stainless steel and windings of pure copper wire.

(d) interleaved primary and secondary windings.

,d vkn'k VkUlQkej og g ftle &

(a) ikFkfed ,o f}rh;d ckbfUMx d fy, ,d mHk;fu'B dkj gA

(b) pEcdh; {kj.k vkj gkfu ugh gA

(c) dkj LVuyl LVhy dk ,o ckbfMx 'k) rkc d rkj dk gA

(d) ikFkfed ,o f}Rkh;d ckbfUMx bUVjyhHM gA

(xiii) The voltage transformation ratio of a transformer is equal to the ratio of

(a) secondary induced e.m.f. to primary induced e.m.f.

(b) Secondary terminal voltage to primary applied voltage.

(c) Primary turns to secondary turns.

(d) Secondary current to primary current.

,d VkUlQkej dk okYVt VkUlQke'ku vuikr &

(a) $\frac{\text{f}\}\text{rh;d ifjr fo|r okgd cy}}{\text{ikFkfed ifjr fo|r okgd cy}}$

(b) $\frac{\text{f}\}\text{rh;d Vfeuy okYVt}}{\text{ikFkfed vlykbM okYVt}}$

(c) $\frac{\text{ikFkfed yiVk}}{\text{f}\}\text{rh; yiVk}}$

(d) $\frac{\text{f}\}\text{rh;d /kkjk}}{\text{ikFkfed /kkjk}}$

(xiv) Transformer cores are built up from laminations rather than from solid metal so that

(a) oil penetrates the core more easily.

(b) eddy current loss is reduced.

(c) insulation required for the windings is reduced .

(d) air circulation is improved.

VkUlQkej Bkl /kkr d ctk; /kkr d eghu iÙkj d cuk; tkr g D;kfd &

(a) dkj e ry vkl kuh l ?kl tkrk g

(b) Hkoj /kkjk gkfu de gkrh g

(c) ckbfUMxk d fy, fo|rjk/kh dh t:jr de gkrh g

(d) ok; dk vkokxeu c< tkrk gA

(xv) Which of the following connections is best suited for 3-phase, 4 wire service ?

(a) Delta-Delta (b) Star-Star

(c) Delta-Star (d) Star-Delta.

P.T.O.

rhu (3) Qt] 4-rkj lok (service) d fy, fuEufyf[kr e l dku&lk duD'ku lcl mi;Dr g \

(a) MYVk&MYVk (b) LVkj&LVkj

(c) MYVk&LVkj (d) LVkj&MYVkA

(xvi) The principle of operation of a 3-phase induction motor is most similar to that of a

(a) synchronous motor

(b) repulsion-start induction motor

(c) transformer with a shorted secondary

(d) capacitor-start, induction-run motor

,d f=dyk ij.k ekVj dk dk; fl)kUr lcl vf/kd leku g ,d &

(a) rY;dkfyd ekVj d

(b) fjiYlu&LVkV ij.k ekVj

(c) VkUlQkej ft ldk f}rh;d y?kifjiFk gk

(d) difllVj LVkV] ij.k&ju&ekVjA

(xvii) The frequency of voltage generated by an alternator having 4-poles and rotating at 1800 r.p.m. is ..... Hertz.

,d 4-iky iR;koÙkd tk 1800 pØ ifr feuV l ?ke jgk g] ink dh x;h okYVt dh vkofÙk ..... gt gkxhA

(a) 60 (b) 7200

(c) 120 (d) 450

(xviii) The counter e.m.f. of a dc motor :

(a) often exceeds the supply voltage.

(b) aids the applied voltage.

(c) helps in energy conversion.

(d) regulates its armature voltage.

,d fn"V/kkjk ekVj dk foijhr fo|r okgd cy &

(a) ifr okYVt l ge'kk c< tkrk gA

(b) ykx okYVt dh lgk;rk djrk gA

(c) Åtk cnyko e lgk;rk djrk gA

(d) bld vkepj okYVt dk jX;yV djrk gA

(xix) A coil has a resistance of 100 Ω of 90ºC, At 100ºC, its resistance is 101 Ω. The temperature co-efficient of the wire at 90ºC is :

(a) 0.01 (b) 0.1

(c) 0.0001 (d) 0.001

,d d.Myh dk 90º ij ifrjks/k 100 vke gA 100ºC ij bldk ifrjks/k 101 vke gA rk 90º ij rkj dk rkiØe x.kkd gkxk &

(a) 0.01 (b) 0.1

(c) 0.0001 (d) 0.001

(xx) Semi-conductor materials have ..... bonds.

(a) ionic (b) covalent

(c) mutual (d) metallic.

v)pkyd inkFk ..... ckUM l j[kr gA

(a) vk;kfud (b) dkHkyUV

(c) E;P;y (d) eVfydA

GROUP-B

2. Answer ***any five*** questions :– **4x5=20**

fdUgh ikp i'uk d mÙkj n &

(i) Explain the following terms :

fuEufyf[kr dh 0;k[;k dj &

(a) Magnetic field ¼pEcdh; {k=½

(b) Magnetic flux density ¼pEcdh; ¶yDl ?kuRo½

(ii) State and explain Kirchoff's law.

fdjpkQ d fu;e dk crk, ,o mldh 0;k[;k djA

(iii) What do you mean by transformation Ratio of the transformer ?

VkUlQkej d VkUlQke'ku vuikr l vki D;k le>r g\

(iv) Draw the symbol and CB configuration of NPN and PNP transistor.

,u ih ,u rFkk ih ,u ih VkfUtLVj dk irhd fpà ,o lhŒchŒ jpuk dk [khpA

(v) What do you understand by the term Amplifier? Explain.

,Eiyh Qk;j l vki D;k le>r g \ bldh 0;k[;k djA

(vi) Write different type of memories and explain in brief.

fofHkUu idkj dh eekjh dk fy[k ,o l{ki e 0;k[;k djA

GROUP-C

Answer ***any four*** questions :– **10x4=40**

fdUgh pkj i'uk d mÙkj n k&

3. (a) Derive an expression for lifting power of a magnet. **4**

,d pEcd dh mRFkkiu 'kfDr d fy, 0;t d ikIr djA

(b) Two magnetically coupled coils have a co-efficient of coupling of 0.5. When they are connected in series, their inductance is 80 mH and when connection of one of the coil is reversed, the total inductance becomes 40 mH. Calculate their self and mutual inductances. **6**

pEcdh; :i l xfFkr nk d.Mfy;k dk ;Xeu x.kkd 0.5 gA tc nkuk dk J.kh Øe e tkMk tkrk g rk mldk ijdRo 80 mH gA tc ,d d.Myh d flj dk cny fn;k tkrk g rk

ijdRo 40 mH gk tkrk gA d.Myh dk Lo&ijdRo rFkk vU;k;U; ijdRo fudkyA

4. (a) What are the necessity of starter for starting 3-*f* Induction motor ? **2**

f=dyk ij.k ekVj d fy, ikjEHkd dh D;k vko';drk g\

(b) What are different types of starters used in 3-phase Induction Motors ? Explain star-Delta starter with diagram. **8**

f=dyk ij.k ekVj e mi;kx gkuoky fofHkUu idkj d vkjEHkd dku&dku l g \ fp= d lkFk LVkj&MYVk ikjEHkd dk le>k,A

5. (a) What do you know about Induction type energy metre? **2**

ij.k idkj Åtkekih d ckj e vki D;k tkur g \

(b) Explain the working principle of home service energy metre. **8**

?kj lok Åtkekih d dk;&fl)kUr dk o.ku djA

6. (a) What kinds of impurities are found in semi-conductor? Explain the differences among them. **08**

P.T.O.

v)pkyd e fdru idkj dh v'kf);k gkrh g \ mud eè; d vrjk dk foLrr <x l le>k,A

(b) 'A transistor is current operated device'. Explain in brief. **02**

^VkfUtLVj ,d /kkjk ifjpkfyr ;= gA* l{ki e 0;k[;k djA

7. (a) Explain light emitting diode. **07**

ykbV bfefVx Mk;kM dh 0;k[;k djA

(b) The current gain of a transistor in common emitter configuration is 70. What is the base current if the emitter current is 8.8 mA ? **03**

,d dkeu bfeVj cukoV e VkfUtLVj dk /kkjk xu 70 gA cl /kkjk D;k gkxh] vxj bfeVj /kkjk 8.8 mA g \

8. (a) Write the name of four basic logic gates. **02**

pkj cfld ykftd xVk d uke fy[kA

(b) Draw the symbol of SCR. Explain its turn on mechanism giving transisterised model of SCR. **08**

,l lh vkj dk irhd [kheA ,l lh vkj dk VkfUtLVj ekMy nr g, bld Vu vku edfuTe dh 0;k[;k djA

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