www.makautonline.com
HTTP://WWW.MAKAUT.COM

2013
BASIC ELECTRICAL & ELECTRONIC ENGINEERING – II
(EE PART)

Full Marks : 35

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

Choose the correct alternatives for any *five* of the following : $5 \times 1 = 5$

i) Iron loss of a transformer is 100 watt at half load. At full load the iron loss would be

a) 100 watt b) 50 watt

c) 200 watt d) 400 watt.

ii) A series motor will run at very high speed when

a) the load is increased

b) the field is opened

c) the armature is opened

d) the load is removed.

HTTP://WWW.MAKAUT.COM
HTTP://WWW.MAKAUT.COM

iii) The resistance R_0 of the exciting branch of t equivalent circuit of a 3-phase induction mot represents

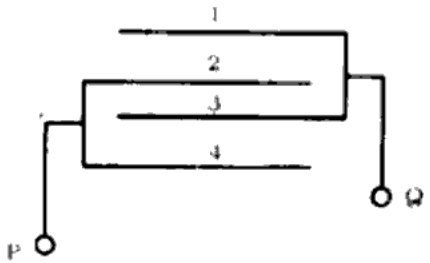
a) stator core loss

b) stator copper loss

c) friction and windage losses

d) rotor copper loss.

iv) If the capacitance between two successive plates is 0·5 as shown in figure, the value of capacitance of tl equivalent system between P and Q is



a) 1 C b) 0·5 C

c) 1·5 C d) 2 C.

v) In a 3-phase 4-wire, balanced system, the current i each phase is 10 A. The current through the neutr wire will be

a) 30 A b) 10 A

c) 0 d) 15 A.

vii) In a transformer, the flux phasor

a) leads the induced *emf* by 90°

b) lags the induced *emf* by 90°

c) leads the induced *emf* by slightly less then 90°

d) lags the induced *emf* by slightly less than 90°.

GROUP – B

(Short Answer Type Questions)

Answer any *two* of the following. 2 × 5 = 10

A 3-phase induction motor is supplied with 3-phase balanced supply. Explain how rotating magnetic field is produced in the motor.

duce an expression showing the relation between electric id strength and potential.

w and explain the speed-torque characteristics of a dc shunt motor (ii) dc series motor.

w and explain the phasor diagram of a single phase nsformer under lagging p.f.

GROUP – C

(Long Answer Type Questions)

Answer any *two* of the following. 2 × 10 = 20

Derive the *emf* equation of a *dc* generator.

A shunt motor has a rated armature current of 40 A when connected to 200 V. The rated speed of the motor is 1000 rpm. The armature resistance is 0·2 ohm. Find the speed of the motor if total torque is reduced to 70% of that at rated load and a 3 ohm resistance is inserted in series with the armature. 4 + 6

7. a) Explain why usually the low voltage winding is exci and the high voltage winding is open circuited for o circuit test of a transformer.

b) Why is the core of a transformer laminated ?

c) The open circuit and short circuit test data of a 6 k 200/400 V, 50 Hz, single phase transformer ar open circuit test : primary voltage = 200 V, I = 0·7 W = 75 W.

Short circuit test : primary voltage = 18 V, short circ current on the secondary side = 12·5A, W = 60W.

Find the parameters of the equivalent circuit. 2 + 2

8. a) Discuss briefly the principle of speed control of 3-phase induction motor by variation of input volta frequency.

b) A three phase, 415 V, 50 Hz star connected 4-pc induction motor has stator impedan $Z_1 = (0{\cdot}2 + 10{\cdot}5)\ \Omega$ and rotor- impedance referred stator side is $Z_2 = (0{\cdot}1 + 10{\cdot}5)\ \Omega$ per phase Tl magnetizing reactance is 10 Ω and resistan representing core loss is 40 Ω on per phase bas Determine the rotor current at slip of 0·04. 4 +

9. a) State and Prove Gauss' law.

b) What are meant by 'potential' & 'potential difference' ?

c) Deduce an expression for electric field intensity due t isolated point charge + q. 4 + 3 +

ES-201 (Pt-II-ECE)

CS/B.Tech (NEW)/SEM-2/ES-201 (Pt-II-ECE)/2013

2013
BASIC ELECTRICAL & ELECTRONIC ENGINEERING – II
(ECE PART)

Full Marks : 35

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

Choose the correct alternatives for any *five* of the following : 5 × 1 = 5

1. The threshold voltage of an enhancement PMOS is

a) negative

b) positive

c) zero with respect to source

d) zero with respect to drain

iii) For a source follower circuit, the voltage gain is

a) zero

b) slightly greater than unity

c) slightly less than unity

d) none of these.

iii) The expression of closed loop gain $\left(A_f\right)$ for positiv feedback amplifier is

a) $\frac{A}{1 + A\beta}$ b) $\frac{A}{1 - A\beta}$

c) $\frac{1}{1 + A\beta}$ d) $\frac{1}{1 - A\beta}$

iv) CMRR of an OPAMP is the ratio of

a) $\frac{\text{Differential Gain}}{\text{Common mode Gain}}$ b) $\frac{\text{Common mode Gain}}{\text{Differential Gain}}$

c) $\frac{\text{Slew Rate}}{\text{Common mode Gain}}$ d) $\frac{\text{Slew Rate}}{\text{Differential Gain}}$

v) Conversion of $(444{\cdot}456)_{10}$ unto its octal equivalent is

a) 673·5136 b) 674·35136

c) 674·735 d) none of these.

vi) NOR and NAND are called Universal logic gates becaus

a) they are independent of input voltage starts

b) any logic function can be realized by these gates

c) it provides minimization technique

d) none of these.

GROUP – B

Answer any *two* of the following. $2 \times 5 = 10$

Draw schematically the structure of an *n*-channel JFET and define the terms source, drain, gate and channel. Explain the importance of the term "Field effect".

With the help of a block diagram, explain the working principle of a feedback amplifier. Derive an expression for the voltage gain with feedback.

What is an operational amplifier (Op-Amp) ? Mention the properties of an ideal Op-Amp. What type of feedback is used in an Op-Amp adder ?

a) Perform the following number conversions

(i) $(10110.1101)_2 = (?)_{10}$

(ii) $(143.3125)_{10} = (?)_2$

b) Realize the Boolean expression using minimum number of NOR gates.

$Y = (A + \bar{B})\ (\bar{A} + B)$ $3 + 2$

GROUP – C

Answer any *two* of the following. $2 \times 10 = 2$

6. a) What are the advantages of FET over BJT ?

   b) What do you mean by pinch-off voltage ?

   c) As V_{GS} is changed from –1 V to – 1·5 V keeping V_D constant, I_D of FET drops from 7 to 5 mA. What is th transconductance of FET ? If the *ac* drain resistance i 200 kΩ, find also the amplification factor of the FET.

   3 + 2 +

7. a) Draw and explain the operation of an Op-Am integrator circuit.

   b) An inverting amplifier has R_F = 500 kΩ, R_1 = 5 kΩ Determine the voltage gain, output voltage and inpu current if the input voltage is 0·1 V. 5 +

8. a) Draw the circuit diagram of an emitter follower an explain the nature of feedback in this circuit. What the feedback topology of emitter follower ?

   b) The open loop gain of an amplifier changes by 20% du to the changes in the parameters of the active amplifi device. If a change of gain by 2% is allowable, what typ of feedback has to be applied ? If the amplifier gain wi feedback is 10, find the minimum value of the feedba ratio and the open loop gain. 4 +

Write short notes on any *two* of the following : 2×5

a) Enhancement type MOSFET

b) Barkhausen Criteria

c) CMRR

d) De Morgan's Theorem.