CODE : ES 201 (Pt-I-EE)

CS/B.TECH (NEW)/SEM-2/ES-201 (Pt-I-EE)/2012

2012

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 Question)

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

   i) In a three phase balanced system, line voltage makes an angle with phase voltages

      a) 30° b) 60°

      c) 90° d) 120°

   ii) The speed in which stator magnetic field rotates is called

      a) actual speed

      b) synchronous speed

      c) slip speed

      d) super-synchronous speed.

   iii) If a *d.c.* series motor is started at no load, the speed will be

      a) rated speed

      b) zero

      c) very high

d) half of the rated speed

iv) If two static charges having magnitude 1 coulomb each are placed at 1 m apart in space, the electrostatic force developed between the charges is

a) 90×10^{10} newtons b) 9×10^{9} newtons

c) 0.9×10^{9} newtons d) 0.

v) The regulation of a transformer is negative, if the load at the secondary side is

a) resistive

b) inductive

c) capacitive

d) combination of resistive, inductive & capacitive.

vi) Which of the following is a four-wire system?

a) Delta with neutral

b) Star with neutral

c) Both delta & star

d) Any combination of four wires.

GROUP – B

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

2. Prove that the efficiency of transformer is maximum when iron loss is equal to copper loss.

3. Derive an expression for capacitance of a cylindrical capacitor, assuming grounded outer surface.

4. What is a three-phase balanced A.C. system? Show that, in a three-phase balanced *a.c.* circuit, the sum of current in the neutral is zero.

5. Derive the expression of torque of a *d.c.* series motor.

GROUP – C

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

6. a) Explain the principle of operation of a transformer under loaded condition.

   b) A 200 kVA transformer has 400 turns on the primary & 40 turns on the secondary winding. The primary is connected to 2 kV, 50 Hz supply. Find the full load, primary & secondary current, secondary *emf* & the maximum flux in the core. Neglect leakage drop & no-load primary current. 4+6

7. a) Explain the open characteristics (OCC) of a DC generator.

   b) An 8-pole, 400 V shunt motor has 960 wave connected armature conductors. The full load armature current is 40 A & flux per pole is 0.02 Wb. The armature resistance is 0.1 Ω and the contact drop is 1 V per brush. Calculate the full load speed of the motor.

   c) Why starter is needed to start a *d.c.* motor? 2+6+2

8. a) A three-phase induction motor is self-starting. Explain.

   b) Obtain the relation between the slip and frequency of the rotor induced *emf*.

   c) A 4-pole, 3-phase, 275 kW, 440 V, 50 Hz induction motor is running with a slip of 4%. Find –

      i) synchronous speed

      ii) rotor speed

      iii) frequency of the rotor induced *emf*. 3+2+5

9. a) Explain the principle of measurement of balanced 3-phase power by 2-Wattmeter method. Draw the neat circuit & phasor diagrams.

b) These equal impedances (6+j8) Ω are connected across a 400 V, 3-phase, 50 Hz supple. Calculate –

i) The line current & the phase current

ii) power factor

iii) active & reactive drawn by load per phase. 5+5

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ES-201 (Pt-II-ECE)

CS/B.TECH (NEW)/SEM-2/ES-201 (Pt-II-ECE)/2012

2012

BASIC ELECTRICAL & ELECTRONIC ENGINEERING-II (ECE PART)

Full Marks : 35

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GROUP – A

(Multiple Choice Type Question)

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

i) An ideal Op-Amp is an ideal

a) voltage controlled current source

b) voltage controlled voltage source

c) current controlled current source

d) current controlled voltage source

ii) The AND function can be realized by using only *n* number of NOR gates. What is *n* equal to?

a) 2 b) 3

c) 4 d) 5

iii) The Boolean expression $ABC + \bar{A}\bar{B}C + AB\bar{C} + \bar{A}\bar{B}\bar{C}$ is of

a) OR gate b) AND gate

c) EX-NOR gate d) EX-OR gate

iv) Which of the following statements is/are correct in regard to excess 3 code?

a) It is a BCD code

b) It is an unweighter code

c) It is a self complementing code

d) All of these.

v) In Barkhausen criterion, phase of Aβ is

a) 0°

b) multiple of 180°

c) 0° or multiple of 180°

d) 0° or multiple of 360°

vi) In intverting amplifier circuit if input & feedback resistances are 1 kΩ ans 3 kΩ, respectively, i/p voltages is 3 volte and power supply voltage is $\pm$ 6V, then the output voltage of Op-Amp is

a) -6 volt b) +6 volte

c) -9 volt d) +9 volt

GROUP – B

Answer any *two* of the following. 2 x 5 = 15

2. Mention the advantages and disadvantages of negative feedback amplifier.

3. Discuss the operation of op-amp as an integrator.

4. a) Implement the function F = $\overline{(AB + CD)}$ using NAND gates.

b) $(11011)_2 = (?)_{10}$

c) Write down the basic difference between enhancement type and depletion type MOSFETs. 2+2+1

5. a) What is virtual ground of an Op-Amp?

b) Draw and explain the voltage comparator circuit using Op-Amp. 2+3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 2 x 10 = 20

6. a) What is the effect of negative feedback on output impedance and phase distortion?

b) An amplifier has a voltage gain of -100. The feedback ratio is -0.04. Find

i) the voltage gain with feedback

ii) the amount of feedback in dB

iii) the output voltage of the feedback amplifier for an input voltage of 40 mV

iv) the feedback factor

v) the feedback voltage.

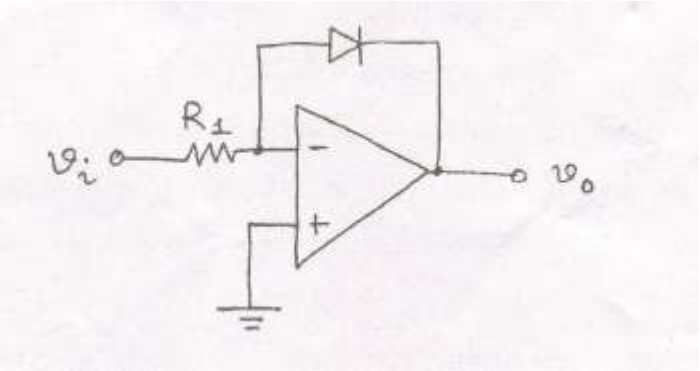
7. a) Explain the basic operation of depletion type *n* channel MOSFET with a suitable diagram.

b) What are the basic differences between BJT and FET?

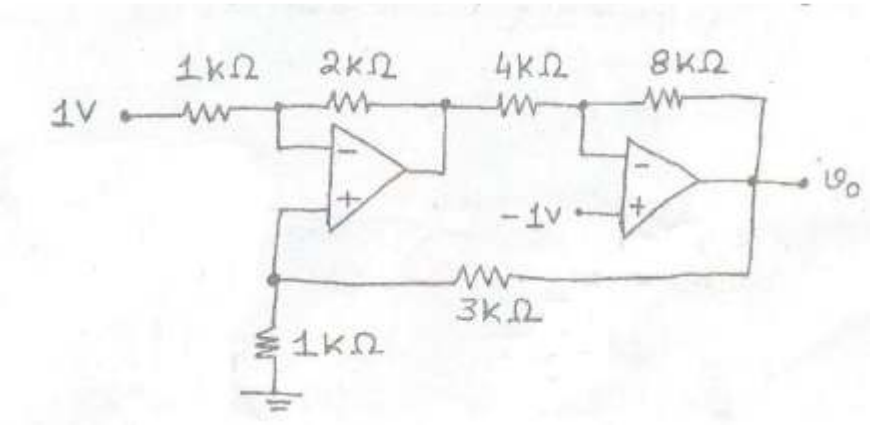
c) As V_{GS} is changed from 0 V to 0.2 V keeping V_{DS} constant, I_D of the FET drops from 10.25 mA to 9.56 mA. What is the transconductance of the FET? If the a.c. drain resistance is 32 kΩ, find the amplification factor of the FET.

d) What do you mean by pinch off voltage for n-channel JFET? 4+2+2+2

8. a) If the feedback resistance R_f is replaced by a diode for a negative feedback amplifier using Op-Amp, then derive the expression of o/p voltage v_o for it. Also mention the type of application for this modification. 4+1



b) For the given circuit find the output voltage v_o.



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11. Write short notes on any *two* of the following: 2 x 5

a) Topologies of feedback amplifier

b) Summing amplifier

c) CMOS

d) Design og exclusive-OR gate.

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