BACHELOR OF CIVIL ENGINEERING EXAMINATION, 2018

(1st Year, 1st Semester, Supplementary)

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

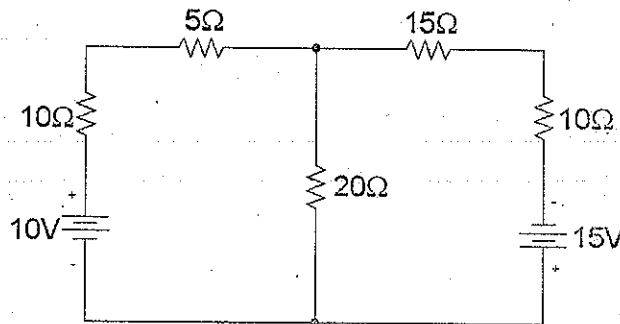Time: Three Hours   Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-I

Answer any three questions

(1)   (a) State and explain superposition theorem for DC networks.   4
     (b) Find the current through 20-ohm resistor using superposition theorem   12

(2)   (a) State and explain Thevenin's theorem for DC networks.   4

(b) A series circuit consists of a resistance of 6Ω, inductive reactance of 8Ω and a capacitive reactance of 12Ω. If this circuit is fed from a source of $200\angle0°$, find the voltage across each of the elements and the current flowing through the circuit.   12

(3)   (a) Explain the phenomenon of resonance in a series R-L-C circuit. What is the significance of Q factor and bandwidth?   4+2=6

(b) A series RLC circuit containing a resistance of 25 Ω, an inductance of 0.15 H and a capacitor of 80 μF is supplied from 230V, 50Hz single phase supply. Calculate the total circuit impedance, the circuit current, power factor and draw the voltage phasor diagram.
                                                                                          10

(4)   (a) What is the concept of back emf in a dc motor?   6

(b) Discuss Speed-Torque characteristics of DC shunt motor and DC series motor.   10

(5)   (a) A 220 V DC series motor has armature and field resistances of 0.15 Ω and 0.10 Ω respectively. It takes a current of 30 A from the supply while running at 1000 rpm. If an external resistance of 1 Ω is inserted in series with the motor, calculate the new steady state armature current and the speed. Assume the load torque remains constant.   10

(b) Derive the equation of a single-phase transformer 6

(6) Write short notes on any four 4×4=16
   (a) Hysteresis loop.
   (b) Maximum power transfer theorem.
   (c) Construction of a dc machine.
   (d) Core type and shell type transformers
   (e) Armature reaction in a DC machine

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PART - II

Q.1. Indicate the correct answer(s)   (1 x 10)

(i) A solid state electronic device consists of

(a) Super conducting material (b) Semi conducting material(c) Metallic material

(d) Insulating material

(ii) Out of the following which one is most widely use in sold state semiconductor device

(a) Uranium (b) radium (c) Calcium (d) silicon

(iii) The depletion region of a junction of diode is deprived of

    (a) Minority carriers   (b) majority carriers

    (c) Both of the majority and minority carriers (d) none of these

(iv) The efficiency of full wave rectifier is

    (a) 40.6%   (b) 75%   (c) 60%   (d) 81.2%

(v) The maximum signal handling capacity of a transistor circuit is found by using

    (a) dc load line   (b) ac load line (c) supply voltage (d) signal frequency

(vi) Compared to common base (CB) amplifier, the common emitter amplifier (CE) has

    (a) Higher current amplification   (b) lower leakage current

    (c) Higher output dynamic resistance   (d) lower input dynamic resistance

(vii) The number of depletion layer in transistor is

    (a) 1   (b) 2   (c) 3   (d) 4

(viii) A JFET has

    (a) High current amplification   (b) High noise level

    (c) Very high input resistance   (d) Very high output resistance

(ix) Positive Feedback amplifier is employed in

    (a) Amplifier (b) Oscillator (c) Biasing circuit (d) Triggering circuit

(X)The radix of a binary system is-

  (a) 1 (b)2 (c) n (d) none of these

2. (a) What are the function of (a) rectifier (b) filter?

(b)What is the main reason for using emitter follower circuit?.

3. (a) . A voltage 100cos100t is applied to a half-wave rectifier with a load resistance 2KΩ.An ideal diode has been used in the rectifier in series with a resistance 1KΩ.Find-

(i) maximum current

(ii) d.c. component of the current

(iii) r m s value of current

(iv) rectifier efficiency

(b) How the ac load line of semi conductor diode can be drawn ? How the operating point changes

With the variation of (1) applied voltage (2) load resistance

4. (a) What do you mean by a logic gate? Name the logic gates.   5X2

  (b) What do you understand by the term "Universal Gate?" Name
(c) What is Full Adder? How many bit it can add?

  (d).Realise the X-OR function using (a)AOl logic

  (e)What is AOl Logic?

  5. An amplifier has an open loop gain A=10000.Now, due to negative feedback the gain is reduced by 10dB.Find out

  (i)   voltage gain of the amplifier with feedback and
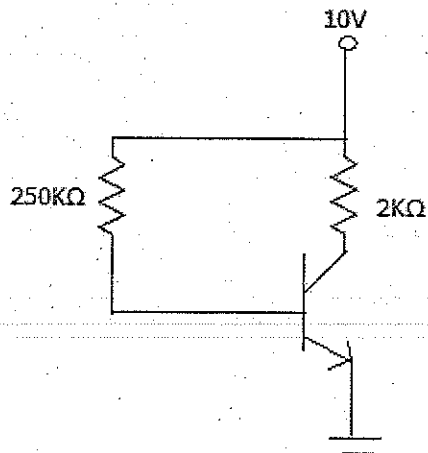
  (ii)   Feedback factor.

  6. (a) Why phase reversal occurs in amplifier ?.

  (b) What is the "stability factor" of a transistor?

  (c) What factor changes the bias stability of a transistor?

7. Find the transistor current and collector to emitter voltage in the adjacent circuit for a silicon transistor with $\beta=100$ and having negligible I_{co} .Assume $V_{BE}=0.7V$

8. Write short notes on any three.

(a) Zener Diode (b) Clamper Circuit (c) Full Wave Rectifier (d) DE-MOSFET (e) Bandwidth of an amplifier