(3 Hours) [Total Marks : 80

N. B. : (1) Question No. 1 is **compulsory**.
    (2) Attempt any **three** questions from remaining.
    (3) Assume suitable data if required. Justify your assumptions.

1. (a) What is back emf? Explain significance of back emf.   5

  (b) Voltage across capacitor C is exponentially increasing with time constant   5
100m/sec. If supply voltage to series RC circuit is 10V, determine Vc
(t) at-
(i) t=50 ms   (ii) t=100ms   t=500ms
Also find C if R=100KΩ

  (c) Explain the difference between BJT and FET.   5

  (d) Derive equation for transient current I_L with initial conditions in case   5
of series RL circuit excited by DC supply (V)

  (e) What do you mean by synchronous speed of a 3-phase induction motor?   5

2. (a) Draw the structure of an N channel JFET & explain its principle of   10
operation also draw its drain and transfer characteristics with the help
of suitable circuit.

  (b) A 4 pole De shunt generator with Lap connected armature supplies a   10
load of 100A at 200V. the armature resistance is 0.1Ω & Shunt field
resistance is 80Ω.
    Find   (i) Total armature current
          (ii) Current per armature path
          (iii) emf generated
Assume a brush drop of 2V.

3. (a) In the circuit shown the input voltage is Vs(t) and the output signal is   10
the current i(t)
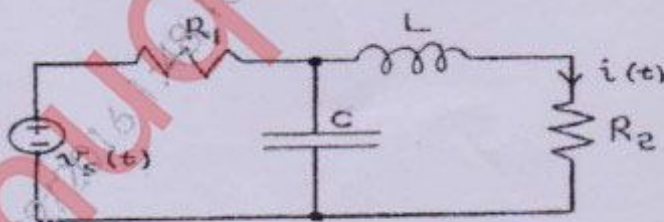
Determine differential equation relating V(t) and i(t)

  (b) Explain construction and working of 3 phase induction motor.   10

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4. (a) Determine amplitude and phase of a network function given below at (j4). **10**

$$\frac{s^3 + 4s^2 + 3s}{s^2 + 6s + 8)\,(s^2 + 10s + 29)}$$

   (b) Explain Different methods of Starting Single phase induction Motor. **10**

5. (a) Explain working of BJT CE amplifier with neat diagram and its characteristics. **10**

   (b) What is meant by brushless DC motor? Explain unipolar BLDC with a neat diagram. **10**

6. Write Short note on any **three** **20**

   a) Transistor Region of operation as an amplifier and switch
   b) Time domain analysis using Laplace transform
   c) Speed control of DC series motor
   d) Pinch-off voltage in a J FET

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