(Time: 3 hours) **Total Marks: 80**

N.B.: (1) Question No. 1 is compulsory.
(2) Solve any three questions from remaining five questions.
(3) Draw neat diagrams and assume suitable data wherever necessary.
Justify your assumptions.

1. Attempt any **four**: 20

(a) Derive an expression for Natural response of RC circuit and time constant

(b) A long shunt d.c. compound generator delivers 110kW at 220V.
If ra= 0.01 Ω ,rse= 0.002,Ω and shunt field has resistance of 110 Ω , calculate the value of induced emf.

(c) Give reason : JFET can be used as a voltage variable resistor.

(d) What are the possible causes of excessive sparking at brushless in a d.c motor

(e) A JFET has a pinch off voltage of -4 volts and the saturation current of 9 ma. Calculate the drain current if Vgs = -2V

2. (a) Compare Enhancement type and Depletion type MOSFET on the basis of their construction, working principle, Characteristics and biasing 8

(b) Comparison of JFET and D-MOSFET 4

(c) The N-channel E-MOSFET has the following parameters 8
Vgs= 3V,V_t=1V,K=0.15mA/V^2, λ=0.003 V^{-1} and Vgs= 8V
Calculate: 1. Drain Current 2. The output resistance

3. (a) Explain Following Effects in FET i) Channel length modulation ii) Velocity saturation effect

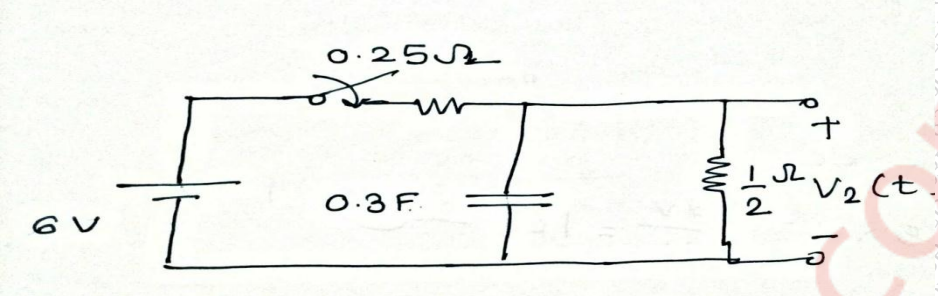
(b) A 6 pole , 500 V wave-connected shunt motor has 1200 armature conductors and useful flux/pole of 20mWb. The armature and filed resistance are 0.5 Ω and 250 Ω respectively. What will be the speed and torque developed by the motor when it draws 20A from the supply mains? Neglect armature reaction. If magnetic and mechanical losses amount to 900W, Find i) useful torque ii) output in KW iii) efficiency at this load 8

4. (a) Explain in details the Starting of “Slip-ring "motors? 12

(b) Explain Working of BJT considering all possible modes of operation 8

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

(b) In the network of fig the switch is open for a long time and at t=0, it is closed. Determine V_2 (t) 10



6. (a) State the type of Synchronous motor 8

(b) Natural response of RLC Network 6

(c) Transfer function 6

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