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**Reg. No. :**

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**Question Paper Code: U6301**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Electrical and Electronics Engineering

21UEE601 – ELECTRIC DRIVES AND CONTROL

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Electric drive is becoming more and more popular because \_\_\_\_\_ CO1- U  
(a) it is simple and reliable (b) it provide smooth and easy control  
(c) it is cheaper in cost (d) All of the above
2. What type of electric drive is used in cranes? CO1- U  
(a) Multimotor (b) group  
(c) Individual (d) None of these
3. The DC motor, which can provide zero speed regulation at full load without any controller is CO1- U  
(a) Series (b) Shunt  
(c) Cumulative Compound (d) Differential Compound
4. Single phase fully controlled rectifier fed separately excited dc motor operates in CO1- U  
(a) Quadrant I & II (b) Quadrant II & III  
(c) Quadrant I & IV (d) Quadrant III & IV
5. The concept of V/f control of inverters driving induction motors results in \_\_\_\_\_ CO1- U  
(a) Voltage controlled current source (b) voltage controlled voltage source  
(c) Current controlled voltage source (d) current controlled current source

6. Variable frequency AC drives found applications in \_\_\_\_\_ CO1- U  
 (a) Pumps (b) Fans (c) Blowers (d) All of the above
7. The back emf set up in the stator of a synchronous motor will depend on CO1- U  
 (a) rotor speed only (b) rotor excitation only  
 (c) rotor excitation and rotor speed (d) coupling angle, rotor speed and excitation
8. Synchronous motor can operate at CO1- U  
 (a) Lagging power factor only (b) Leading power factor only  
 (c) Unity power factor only (d) Lagging, leading and unity power factor only
9. Mechanical time constant  $T_m$  is \_\_\_\_\_ CO1- U  
 (a)  $J \cdot B$  (b)  $J / B$  (c)  $B / J$  (d)  $B^2 / J$
10. Converter Transfer function is \_\_\_\_\_ CO1- U  
 (a)  $V_a(s) / V_c(s)$  (b)  $V_c(s) / V_a(s)$   
 (a)  $V_a(s) / V_c(s)$  (b)  $V_c(s) / V_a(s)$

PART – B (5 x 2= 10 Marks)

11. List the factors influencing the selection of electric drives. CO1 -U
12. Predict when discontinuous conduction mode occurs in converter-fed DC drives. CO3 -Ana
13. Identify the industrial applications benefiting from stator voltage control. CO1 -U
14. State the torque equation applicable to synchronous motors. CO2 -App
15. Enumerate the benefits associated with closed-loop speed control. CO1 -U

PART – C (5 x 16= 80 Marks)

16. (a) Explain in detail with an example (low speed hoist), multi quadrant dynamics in the speed-torque plane. CO1-U (16)  
 Or  
 (b) Explain about the quadrantal diagram of speed-torque characteristics for a motor driving hoist load. CO1 - U (16)
17. (a) Discuss the continuous conduction mode of operation of three phases fully controlled converter fed separately excited dc motor in detail with necessary wave forms and equations. CO2-App (16)

Or

- (b) Discuss the motoring and regenerative braking mode of operation of Two quadrant converter in detail with necessary wave forms and equations. **CO2- App** (16)
18. (a) Explain in detail, the V/f control method of speed control of three phase induction motor drives. **CO1-U** (16)
- Or
- (b) Explain the principle of operation of static Scherbius of slip power recovery scheme. **CO1-U** (16)
19. (a) Using the necessary circuit diagram, explain the voltage source inverter (VSI) fed synchronous motor. **CO4 -Ana** (16)
- Or
- (b) Describe the self-control of synchronous motor fed from VSI. **CO4 -Ana** (16)
20. (a) Analyze the mechanical expression of separately excited DC motor using armature voltage control method. **CO4-Ana** (16)
- Or
- (b) Discuss the current controller design using PI-controller for a separately excited dc motor drive system. **CO4-Ana** (16)

