A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 56301

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Sixth Semester

Electrical and Electronics Engineering

15UEE601- ADAVANCED ELECTRICAL AND CONTROL

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In dc choppers, per unit ripple is maximum when duty cycle α is   CO1- R

    (a) 0.2   (b) 0.5   (c) 0.7   (d) 0.8

2. When only one quadrant operation is required the converter   CO1- R
    normally preferred is_____

    (a) Fully controlled converter   (b) Fully controlled converter with FWD

    (c) Half controlled converter   (d) Sequence control of two series connected converters

3. The slip of an induction motor during DC rheostatic braking is   CO1- R

    (a) 2+s   (b) 2-s   (c) 1-s   (d) s

4. A freewheeling diode in a phase controlled rectifier_____   CO1- R

    (a) Enables the inverter operation
    (b) Smoothens the load current consequently the smoothing inductance required is small
    (c) Makes the converter draw additional reactive power
    (d) Improves the line power factor

5. An elevator drive is required to operate in …………..   CO2- R

    (a) three quadrants   (b) one quadrant only
    (c) two quadrants   (d) four quadrants

6. Which of the following induction motor drive method is more efficient   CO2- R

    (a) Phase voltage control   (b) Rotor side chopper resistance control

    (c) Slip power recovery control   (d) Stator resistance control

7. Which of the following is true for scherbius drive   CO2- R

 (i) regenerative operation

 (ii) super synchronous speed control

 (iii) possible to have mechanical power greater than air gap power

(a) i and ii   (b) i and iii   (c) ii and iii   (d) i, ii and iii

8. In a closed loop controller dc motor drive which is fastest loop?   CO3- R

(a) Speed loop   (b) Current loop

(c) Both speed and current loop   (d) Neither speed loop nor current loop

9. Mechanical time constant Tm is   CO3- R

(a) $J . B$ (b) J / B

(c) B / J (d) $B^2 J$

10. Which of the following is the simulation language ?   CO3- R

(a) GPSS   (b) JAVA   (c) Java script   (d) None o the above

PART – B (5 x 2= 10Marks)

11. Compare AC & DC drives?   CO1- Ana

12. Give the various components of load torque.   CO1- U

13. Sketch the mechanical characteristics of 3 phase IM with v/f control?   CO2- U

14. Using phase shifting principle, find the number of inverters, their phase   CO2- Ana
shifts to suppress harmonics lower than fifteenth in a frequency controlled
induction motor drive.

15. List the use of simulation software packages?   CO3- R

PART – C (5 x 16= 80Marks)

16. (a) Discuss about the selection of electric drives for particular   CO1- Ana   (16)
application

<div align="center">Or</div>

(b) Explain the steady state operation of three phase fully controlled   CO1- Ana   (16)
converter fed separately excited DC motor for first quadrant and
second quadrant mode.

17. (a) What are the classes of duty can be identified for a drive motor and   CO1- U   (16)
how the drive motor rating is chosen for any two classes of duty.

<div align="center">Or</div>

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(b) Analyse the multi quadrant operation of low speed hoist drive with neat diagram   CO1- Ana   (16)

18. (a) Draw and explain the slip power recovery scheme applicable for Three phase slip ring induction motor   CO2-Ana   (16)

Or

(b) (i) Explain the principle of constant air gap flux control strategy with neat block diagram.   CO2-U   (10)

(ii) Derive stator current magnitude in terms of the induction motor parameters, slip speed, and magnetizing current to implement a constant air gap flux linkages drive system.   CO2-App   (6)

19. (a) Explain the operation of v/f control technique of speed control method of Induction motor. List the ways to implement the voltage to frequency ratio   CO4- U   (16)

Or

(b) A 460V, 60Hz 6 pole, 1180 rpm, star connected squirrel –cage induction motor has the following parameters per phase referred to the stator: R_s=0.19Ω, R_r'=0.07Ω, X_s=0.75Ω, X_r'=0.67Ω and X_m=20Ω. The motor is fed by a 6-step inverter which in turn is fed by a 6-fully controlled rectifier.
1. If the rectifier is fed by an ac source of 460V and 60Hz , what should the rectifier firing be to get the rated fundamental voltage across the motor?
2. Calculate the percentage increase in copper loss of the machine at 60Hz, compared to the value when fed by a sinusoidal supply. Neglect skin effect and derating factor due to harmonics.   CO4- App   (16)

20. (a) Analyse the transfer functions of Dc motor, load & converter   CO3- Ana   (16)

Or

(b) Examine the operations of armature voltage control & field weakening mode control.   CO3- Ana   (16)

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