116 : 1st half 11-PH(I)

Con. 3584-11.

RK-3742

(OLD COURSE)

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
     (2) Attempt any **four** questions from the remaining.
     (3) Assume suitable data if **necessary**.
     (4) Illustrate answers with sketches wherever **required**.

1. Explain in brief (any **four**) :–   20

    (a) Explain the importance of $\dfrac{dv}{dt}$ and $\dfrac{di}{dt}$ ratings along with proper protection circuits for SCR.

    (b) State the conditions for getting inversion mode of operation in case of line commutated converters.

    (c) Explain the need for cooling of a power device.

    (d) Explain the basic principle of d.c. chopper operation. Derive an expression for its average d.c. output voltage.

    (e) Explain briefly the following modes of braking a d.c. motor.
       (i) Regenerative braking.
      (ii) Dynamic braking
      (iii) Plugging.

2. (a) A single phase FWCR is operated with resistive load R = 10 ohm, the input voltage 5
      to the bridge is 230 V, 50 Hz supply.
      Calculate the following :
       (i) Average load voltage
      (ii) Average load current
     (iii) Form factor for $\alpha = 60$
     (iv) Ripple factor for $\alpha = 60°$

    (b) Draw all associated waveform of 1-ϕ FWCR circuit. 5
    (c) Explain the full wave a.c. control using TRIAC and DIAC with necessary 5
      waveforms.
    (d) Explain the operation of 3ϕ, HWCR with inductive load with suitable waveforms. 5

3. (a) Draw a circuit diagram for ramp-and-pedestal trigger circuit used for the 1-ϕ 5
      semiconverter with appropriate waveforms.
    (b) Explain with the help of layer diagram the construction of TRIAC. 5
    (c) Give the comparison between TRIAC and Thyristor. 5
    (d) Discuss the static latch-up and dynamic latch-up in an IGBT. 5

[**TURN OVER**

4. (a) What is an inverter ? Give important design aspects of any inverter circuit.   5
   (b) Draw the circuit diagram and explain the working of single phase parallel inverter   5
       with free wheeling diodes with suitable waveforms.
   (c) State the important limitations of series inverter.   5
   (d) Explain the operation of 1-ϕ bride inverter with the help of voltage waveforms.   5

5. (a) Explain the working of step-up and step-down chopper.   5
   (b) Explain the continuous conduction mode and non-continuous conduction mode   5
       of type A chopper.
   (c) Explain the operation of Jones chopper with the waveforms across load and   5
       capacitor voltage.
   (d) Mention the advantages of Jones Chopper circuit over the other chopper circuit.   5
       Also give its applications.

6. (a) Explain various schemes of D. C. Motor speed control.   5
   (b) Draw and explain the power circuit of semiconverter feeding a separately excited   5
       D. C. Motor.
   (c) Explain the operation of induction motor CSI.   5
   (d) Explain briefly the operation of round rotor synchronous motor. Derive the   5
       expression for field excitation.

7. Write short notes on any **four** of the following :—   20
       (a) Effect of source inductance on output of FWCR
       (b) Microcontroller based speed control of D. C. Motor
       (c) IR compensation techniques
       (d) Triggering circuits using IC TCA 785
       (e) Slip-power recovery scheme of A. C. drives
       (f) Types of cooling methods.

Con. 3219-11.   **(OLD COURSE)**   **RK- 3744**

(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** out of remaining **six** questions.

(3) **Figures** to the **right** indicate **full** marks.

(4) Assume **suitable** data if **required**.

1. Solve the following :—   20
    - (a) What is range sensor and its applications ?
    - (b) Explain different types of gear systems.
    - (c) Explain multi channel data acquisition system.
    - (d) Explain Mechatronics system with its key elements.

2. (a) Explain in detail Mechatronics design process with its block diagram, operation   10
        and importance.
    (b) What is adaptive control system and compare the performance of different types   10
        of adaptive control systems ?

3   (a) Draw and explain block diagram of PLC with its selection criteria and features.   12
    (b) Explain the concept of ladder diagram programming and draw ladder diagram for   8
        NAND, XOR, Latch and OR logic.

4. (a) Derive the expression for 4 phase permanent magnet stepper motor.   10
    (b) Explain Mechatronics control in automated manufacturing in detail.   10

5. (a) Explain the importance of PID tuning and describe the respective tuning methods.   10
    (b) Explain the pressure sensors used in Mechatronics.   10

6. (a) Compute the block diagram representation of following temperature measuring   10
        circuit shown in **figure**.
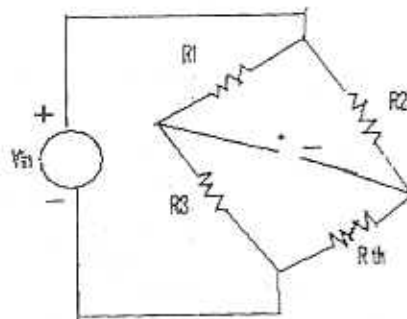
    (b) What is Fuzzy logic control and its applications in Mechatronics.   10

7. Write short notes on following :—   20
    - (a) Micro sensor and its fabrication
    - (b) Hardware-in-loop
    - (c) Control system design techniques.

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Con. 3359–11.   (OLD COURSE)   RK–3756

(3 Hours)   [Total Marks : 100]

N.B. : (1) Question No. 1 is **compulsory**.

     (2) Attempt any **four** questions from remaining **2 to 7**.

     (3) Assume **suitable** data if **necessary**.

1. (a) Explain different XDSL technologies.   8

    (b) Compare TCP and UDP.   6

    (c) Describe IEEE 802.5 token ring protocol operation.   6

2. (a) Make a comparison between synchronous time division multiplexing and statistical   8
time division multiplexing. Describe briefly about digital carrier standards.

    (b) Draw ATM protocol architecture. Explain ATM adaptation layer with respect 12
to services and protocols.

3. (a) Explain the following protocols with suitable diagrams :–   12

       (i) Stop and wait ARQ

       (ii) Goback N ARQ

       (iii) Selective reject ARQ.

    (b) Describe common channel signalling and SS7 signalling system.   8

4. (a) Explain the OSI model giving functions of each layer.   10

    (b) Describe in details HDLC protocol with respect to the following :–   10

       (i) Data transfer mode

       (ii) Frame structure and type.

5. (a) What is blocking in circuit switched networks ? Derive the condition for   6
nonblocking.

    (b) Explain the flooding technique in packet switched networks ? How the number   6
of packets can be regulated ?

    (c) Explain the protocol architecture of frame relay.   8

6. (a) Draw and explain ATM cell format.   10

    (b) Explain Dijkstra's routing algorithm with an example.   10

7. (a) Give the physical layer specifications of different types of IEEE 802.3   10
10 Mbps, IEEE 802.3 100 Mbps LAN.

    (b) Explain CSMA/CD protocol with diagrams.   10

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