2nd Half-12 mlna-(d)-52

Con. 9393-12.   (OLD COURSE)   **KR-6483**

(3 Hours)   [Total Marks : 100

N. B. : (1) Question No. 1 is **compulsory**.
        (2) Attempt any **four** questions from remaining **six** questions.
        (3) **Figures** to the **right** indicate **full** marks.
        (4) Assume **suitable** data if **required**.

1. Solve any four:
   (a) What are the various triggering methods of SCR? Explain one in detail
   (b) Explain how dv/dt and di/dt protection circuits are useful for SCR
   (c) Define latching current, holding current, forward break over voltage, reverse
       break over voltage and write value of general rating of SCR.
   (d) Explain the operation of basic series Inverter with relevant waveforms and
       state its limitations.
   (e) What are different performance parameters for controlled rectifiers? Explain their
   significance.

2. (a) Explain Latchup in IGBT. How does the latchup take place and how to avoid
       latchup?   [10]

   (b) Explain need of isolation in Power Electronics? Draw the various circuits available
       for isolation.   [10]

3. (a) Compare (i) SCR and IGBT (ii) SCR and TRIAC (iii) SCR and GTO.   [10]

   (b) The half wave converter is feeding resistive load and firing angle is a = $n/2$.
       Find (i) Rectification efficiency (ii) Form factor (iii) Ripple factor (iv) TUF and
       (v) PIV of thyristor.   [10]

4. (a) Explain the operation of Jones chopper along with waveform across load and
       capacitor voltage. Obtain an expression for circuit turn off.   [10]
   (b) In Jones chopper C= 30 µf, Ll = 100 µH(series with capacitor), L2 = 20µH, Vs = 110V
   Find out the highest turn off time for main SCR TI and maximum load current that
   can be safely commutated.   [10]

5 (a) Explain the operation of complementary commutation circuit. Draw the waveform
   across anyone SCR and capacitor.   [10]
   (b) Explain the operation of basic series inverter and obtain an expression for turn off time
   available in terms of Wo and Wr   [10]

[TURN OVER

6. (a) Explain Variable voltage and variable frequency (V/F) method of speed control for
   3-phase induction motor.   [10]
(b) Explain Microcontroller based speed control of D.C. Motor.   [10]

7. Write short notes on (any three):   [20]
(a) Cooling methods of power semiconductor devices
(b) IR compensation
(c) Modified series inverter
(d) Parallel inverter.

Con. 9618–12.　　　　(OLD COURSE)　　　　KR–6672

(3 Hours)　　　　[Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
　　　　(2) Attempt any four questions out of the remaining six questions.
　　　　(3) Assume suitable data if required.

1. (a) Briefly explain OSI model and specify the functions of each layer. 　10
   (b) Compare different LAN topologies. 　10

2. (a) With a block diagram explain synchronous time division multiplexing. 　10
   (b) Make a comparison between circuit switching and packet switching. 　10

3. (a) With a suitable example explain Dijkstra's algorithm. 　10
   (b) Explain different ISDN channels. 　10

4. (a) Explain the format of different types of frames supported by HDLC. 　12
   (b) What are the features of ADSL technology ? 　8

5. (a) Explain in detail the format of an ATM cell. 　12
   (b) Give the steps in generating internet checksum. 　8

6. (a) Compare Goback N.ARQ and selective Reject ARQ. 　10
   (b) Distinguish between ATM and frame relay. 　10

7. Write short notes on any four :– 　20
      (a) FDM
      (b) SS7
      (c) FDDI
      (d) Frame relay
      (e) Transmission impairments.

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ws-Sept. 2012 (c) 72

Con. 10454–12. (OLD COURSE) KR–7191

(3 Hours) Total Marks : 100

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

(2) Attempt any four questions of the remaining six questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if required.

1. Answer any four of the following :— 20

   (a) Give the list of gear types and draw any two diagrams of gears.

   (b) What is hardware-in-the-loop simulation ? What are its advantages over pure simulation ?

   (c) Explain ground chair representation of mass.

   (d) Explain the basic principle of range sensors.

   (e) What is overframing ? How is it overcome ?

2. (a) Explain the key elements of mechatronic system with a neat block diagram. 8

   (b) Describe the mechatronics design process. 12

3. (a) Construct the block diagram model for the following mechanical lever system. 10
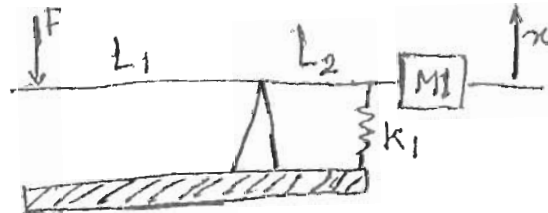
   (b) Construct the block diagrm representation for the following electrical circuit. 10

| TURN OVER

4. (a) Explain the basic principle of piezoelectric transducer. Derive the expression   10
   for voltage. Draw mechanical diagram of piezoelectric accelerometer.

   (b) Explain the components of Data Aquasition and control system.   10

5. (a) Explain various forms of adaptive control system.   12

   (b) A three mode controller has K_p as 2, K_I as 0·1/sec, K_D as 1 sec and a setpoint   8
   output of 50%. The error starts at zero and changes at 5% /sec for 2 sec before
   becoming constant for 3 sec. It then decreases at 2%/sec to zero and remains
   at zero. What will be the controller output at (i) 0 sec (ii) 3 sec (iii) 7 sec ?

6. (a) Explain PLC with the help of block diagram. Also explain selection procedure   8
   and features of PLC.

   (b) A lead compensator is designed to modify the behaviour of the plant $G_x(s) = \dfrac{1}{s^2 + 1}$ 12

   such that the following performance specifications are met.
        (i) $\zeta \geq 0·707$ (ii) $\tau \leq 0·1$ sec   (iii) the system is stable.

7. Write short notes on :–
      (a) Artificial intelligence in mechatronics   6
      (b) Fuzzy logic   7
      (c) Various tuning methods of PID controller.   7

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AGJ–2nd half (m)–12–21

Con. 9884–12. (OLD COURSE) KR-6912

(3 Hours) [Total Marks : 100

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

   (2) Attempt **any four** questions from remaining **six** questions.

   (3) Draw **necessary** figures or sketches wherever **required**.

1. (a) Define DOF and work volume. What is the work volume for a cyclindrial robot ? 20
   (b) Define rotation. Develop fundamental rotation matrices for Yaw, Pitch and roll operations.
   (c) Explain Tool configuration vector; and explain its significance in IK solutions.
   (d) Classifty and compare robot as per the drive technology.

2. (a) With respect to pick and place trajectory, explain pick-up point, lift-off point, set-down 10
       point and place point.
   (b) Perform Direct Kinematics for a four axis SCARA robot. Draw link coordinate diagram, 10
       develop Kinematic parameter table and arm equation.

3. (a) Why the inverse Kinematics solutions are not unique ? State and explain various 10
       properties of Inverse Kinematic solutions.
   (b) Explain piece-wise linear interpolation with parabolic blend and also state the advantages 10
       of it.

4. (a) What are the various template matching techniques of a grey level image and their 10
       applications to the robot vision.
   (b) Explain the operation of NC and CNC machines. 10

5. (a) What are the various edge detection methods for polynomial objects ? Explain. 10
   (b) Explain guarded motion and compliant motion used in fine motion planning techniques 10
       with neat sketches and advantages.

6. (a) Perform work space analysis of 5 axis robot. 10
   (b) Explain the perspective transformation and inverse perspective transformation. 10

7. Write a short note on :– 20
   (a) Bounded Deviation Algorithm (BDA)
   (b) Moment of Inertia and dynamic performance of robot arm.