AR13

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017
ENVIRONMENTAL ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max. Marks: 70**

PART-A

ANSWER ALL QUESTIONS   **1 x 10= 10M**

1. a) What is design period?
   b) What is the effect of fluoride on human health and what is its limit in drinking
      water?
   c) What is Floc?
   d) What is the purpose of residual chlorine?
   e) Enumerate the treatment methods to remove colour and odour from water?
   f) What is Dry Weather Flow.
   g) Where do you use inverted siphons?
   h) Why COD is more than BOD for a given sewage?
   i) Define sludge volume index
   j) What are the various stages of anaerobic sludge digestion?

PART – B

Answer one question from each unit   5 x 12 = 60M

UNIT-I

2.a) The population of city obtained from census report is as given below

Year	1951	1961	1971	1981	1991	2001
Population	27800	34700	41500	47350	54600	61700

      Estimate the population for the year 2021 & 2031 by arithmetical increase &
geometrical increase methods? Comment on the values.
 b) What are the common sources of water for water supply scheme?
    State the factors that govern the selection of particular source?

(OR)

3.a) Explain hourly Fluctuations in demand of water? What is its importance in the design of
   water works. How do you manage these Fluctuations while designing the water supply
   scheme.
 b) Describe Chemical characteristics of water and their effects.

UNIT-II

4.a) Design a set of rapid gravity filters for treating water required for 2 lakhs population. Rate of
    water supply is 150 lpcd. Rate of filtration is 5000lit/hr/sq.mt.
 b) Write short note on
      i) Break point Chlorination
      ii) Pre Chlorination
      iii) Double Chlorination

(OR)

5.a) What is optimum dosage of coagulant? How is it determined in the laboratory?
   b) Describe working and back washing process of Rapid Sand Filter with a neat sketch.

UNIT-III

6.a) Describe merits and de-merits of various types of Layouts of distribution systems with sketches.
   b) What is balancing reserve? Explain the procedure to determine it.

(OR)

7. Describe the following with neat sketches
     i) Sluice valve
     ii) Air relief valve
     iii) Non-return valve

UNIT-IV

8. a) Describe Sewerage systems and their relative merits. State the conditions under which they are suitable.
   b) Give an account of determination of quantity of storm Sewage.

(OR)

9. a) Describe a typical Inverted Siphon with a neat sketch.
   b) Estimate 5day-BOD for a sample of waste water at 20^0 C, whose 3 days BOD at 25^0 C is 180 mg/lit. BOD rate constant k=0.23/day.

UNIT-V

10. Enumerate the importance of primary treatment. State various units in Primary treatment of sewage and briefly discuss them

(OR)

11. a) Explain the factors affecting sludge digestion?
   b) Design a septic tank for a hostel of students 200. Assume suitable data. Show all the relevant checks in the design.

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CODE: 13EE4022   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017

POWER SEMI CONDUCTOR DRIVES
(Electrical & Electronics Engineering)

Time: 3 Hours   **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) What is meant by electrical drives?
    b) Point out the advantages of electrical energy over other forms of energy
    c) Differentiate advantages and disadvantages of D.C Drives
    d) Draw the electric drive system?
    e) Explain what is mean by closed loop control system
    f) How the D.C. motor is affected at the time of starting?
    g) Compare duty ratio & Duty interval?
    h) What is meant by stator voltage control?
    i) How is the static Scherbius drive operated in super synchronous motoring mode?
    j) Which synchronous machine is said to be self controlled?

PART-B

Answer one question from each unit   **[5x12=60M]**
UNIT-I

2.	a	What expectations are there on motors employed in variable speed drives	6M
	b	On what factors the choice of an electrical drive depends?	6 M

(OR)

3.		Derive expressions for Speed and torque for a three phase fully controlled converter connected to separately excited D.C motor with continuous current operation. Draw the relevant waveforms	12M

UNIT-II

4.	a	Derive the fundamental torque equation of an electrical drive	4M
	b	Explain the four quadrant operation of electrical drive with example.	8M

(OR)

5.	a	Describe the operation of a closed loop speed control scheme with inner current control loop?	6M
	b	How do you define passive and active load torques? What are the differences between the two?	6M

UNIT-III

6		A 230v, 1000rpm 30A separately excited motor has the armature resistance and inductance of 0.7 Ω and 50mH, respectively. Motor is controlled in regenerative braking by a chopper operating at 800 Hz from a dc source of 239 V. Assuming continuous conduction	12 M

      (i) Calculate duty ratio of chopper for rated torque and the speed of 800 rpm.

      (ii) What will be the motor speed for duty ratio of 0.6 and rated motor torque.

<div align="center">(OR)</div>

7.	a	Analyze the two quadrant chopper feeding to a separately excited DC motor and also draw the current and voltage wave forms for continuous current operation	6M
	b	Derive expressions for speed and torque for I quadrant chopper feeding to a separately excited DC motor and also draw the current and voltage wave forms for continuous current operation.	6M

UNIT-IV

8.	a	Show that a variable frequency Induction motor drive develops at all frequencies the same torque for a given slip-speed when operating at constant flux.	8M
	b	Compare CSI and VSI drives	4M

<div align="center">(OR)</div>

9.	a	Why stator voltage control is suitable for speed control of induction motors in fan and pump drives?	4M
	b	A 3-phase delta connected squirrel cage induction motor takes 1.2 times the full load current and develops 0.8 times the full load torque at stand still when started by star –Delta starter. An auto transformer is to be selected for the same motor for some other application. What should be the secondary to primary turns ratio so that the starting current will not exceed 1.2 times full load current? What will be the starting torque?	8M

UNIT-V

10.	a	Why the slip power recovery scheme is suitable mainly for drives with a low speed range?	4M
	b	A 20 kW, 3-phase, 440V, 4 pole, delta connected permanent magnet synchronous motor has following parameters. Xs = 5 ohm, Rs = 0, rated power factor =1.0. Machine is controlled by variable frequency control at a constant (V/f) ratio. Calculate armature current, torque angle and power factor at half full load torque and 750 rpm	8M

<div align="center">(OR)</div>

11.	a	What are the assumptions made in the static resistance control of wound rotor induction motors?	4M
	b	A460V, 60Hz,1176rpm ,6 pole, star connected squirrel cage induction motor has a following equivalent circuit parameters per phase referred to the stator : Rs=0.29 Ω, Rr'=0.145Ω, Xs=0.21,Xr'=0.5Ω, Xm=13.3Ω, the motor is supplied from a current source inverter. The flux is maintained constant at the rated value. Calculate i) the stator current and DC link current when the machine operates at rated torque and 60Hz.ii) the inverter frequency and dc link current for a speed of 600rpm and rated torque.	8M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017
REFRIGERATION AND AIR CONDITIONING
(Mechanical Engineering)

Time: 3 Hours   **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) What is refrigeration?
    b) Define refrigeration effect.
    c) What is the difference between heat pump and refrigerator?
    d) What is the advantage of using multistage compression compared to single stage compression?
    e) Desirable properties of refrigerant.
    f) What will happen to the room temperature, if the refrigerator door is kept open in a closed room, and why?
    g) Define Peltier effect.
    h) Define psychometry.
    i) Define bypass factor.
    j) Define sensible heat ratio

PART-B

Answer one question from each unit   **[5x12=60M]**

UNIT-I

2. a) Discuss the advantages of the dense air refrigerating system over an open air refrigeration system?   **[3 M]**
    b) A Bell-coleman refrigeration cycle works between 1 bar and 6 bars. The adiabatic efficiency of compression is 90% and expansion is 95%. Find the COP of the system and its tonnage when the airflow rate is 2 kg/sec. The ambient temperature is 25^0C and refrigerator temperature is -5^0C.   **[9 M]**

(OR)

3. a) The COP of an air refrigeration cycle is very low, even then why air-refrigeration system is most common in the aircraft?   **[3 M]**
    b) In an aeroplane simple air refrigeration is used. The main compressor delivers the air at 5 bar and 200^0C. The bled air taken from compressor is passed through a heat exchanger, cooled with the help of ram air so that the temperature of air leaving the heat exchanger is 45^0C and the pressure is 4.5 bar. The cooling turbine drives the exhaust fan, which is used to force the ram air through the heat exchanger. The air leaving the heat exchanger passes through the cooling turbine and then supplied to cabin at 1 bar. The pressure loss between the cooling turbine and cabin is 0.2 bar. If the rate of flow of air through the cooling turbine is 20kg/min, determine the following: **[9 M]**
        (i) The temperature of the air leaving the expander,
        (ii) The power delivered to the ram air which is passed through the heat exchanger
        (iii) Tthe refrigeration load in tones when the temperature of the air leaving the cabin is limited to 25^0C.
        Assume that the isentropic efficiency of the cooling turbine is 75% and no loss of heat from air between the cooling turbine and cabin. Take γ = 1.4 and C_p=1kJ/kg.K.

UNIT-II

4. a) Mention the advantages of vapour compression refrigeration system over air refrigeration system. **[3 M]**

b) A 5 ton Freon-12 refrigeration plant has saturated suction temperature of -5^0C. The condensation takes place at 32^0C and there is no under cooling of refrigerant liquid. Assuming isentropic compression, find, **[9 M]**

i. C.O.P. of the plant.
ii. Mass flow rate of refrigerant.
iii. Power required to run the compressor in kW.

(OR)

5. a) Explain the working of a simple vapour compression system with the help of a schematic diagram. **[3 M]**

b) A freezer of 20 tons capacity has evaporator and condenser temperatures of -35^oC and 25^oC, respectively. The refrigerant is Freon - 22. It is sub-cooled by 4^oC in the condenser before it enters the expansion valve and is superheated by 5^oC in the evaporator before it enters the compressor. Calculate (i) the mass of refrigerant circulated per minute, (ii) the condenser heat removal rate, (iii) the compressor discharge temperature, (iv) the compressor pressure ratio, (v) the flash gas percentage after throttling, (vi) COP, (vii) the dimensions of the compressor cylinder, if η_{vol} = 85%, L/D ratio = 2, N = 250 rpm and the compressor is single-acting. **[9 M]**

UNIT-III

6. a) Discuss the function of rectifier and analyser in vapour absorption refrigeration systems. **[6 M]**

b) Draw a neat line diagram of Electrolux refrigerator and explain its working principle. What is the important role of hydrogen in this refrigeration system **[6 M]**

(OR)

7. a) What is the basic function of a compressor in vapour compression refrigeration systems? How this function is achieved in vapour absorption refrigeration system? **[6 M]**

b) Draw a neat diagram of lithium bromide water absorption system and explain its working. List the major field of applications of this system. **[6 M]**

UNIT-IV

8. a) List out the merits and demerits of thermo-electric refrigeration system over other refrigeration systems. **[6 M]**

b) Describe working principle of pulse tube system. **[6 M]**

(OR)

9. a) What are the various applications of thermo-electric refrigerator? **[6 M]**

b) Describe the principle of production of hot and cold air from vortex tube. **[6 M]**

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UNIT-V

10. a) Explain the process of heating and humidification.   **[3 M]**

b) The following data refers for a space to be air-conditioned: **[9 M]**
Inside design conditions = 23^0C DBT, 48% RH, outdoor air conditions = 45^0C DBT, 28^0C WBT, room sensible heat gain = 18 kW, room latent heat gain = 6 kW, by-pass factor of the cooling coil = 0.12, the return air from the space is mixed with the outside air before entering the cooling coil in the ratio of 5 : 1 by mass.
Determine
(i) Apparatus dew point
(ii) Condition of air entering and leaving the cooling coil
(iii) Dehumidified air quantity
(iv) Fresh air mass flow and volume flow rate
(v) Total refrigeration load on the air-conditioning plant.

(OR)

11. a) What are the important considerations in the design of an air conditioning system?   **[3 M]**

b) A classroom is to be air-conditioned for the following given summer conditions.   **[9 M]**
The data collected is given as follows:
Size of classroom: $18 \times 12 \times 6$ m, out-door conditions: 42^0C DBT and 52% R.H., required comfort condition: 18^0C DBT and 58% R.H., seating capacity: 45, sensible heat in the room excluding infiltrated load: 40,000 kJ/hr, sensible heat load from other sources: 8000 kJ/hr, lighting load: l2 tubes of 80 watts, infiltrated air: 27 m^3/min. If 35% air is taken from outside and remaining is recirculated then find the following:
(a) Capacity of the cooling coil in tons of refrigeration and its bypass factor
(b) Capacity of the blower in m^3/min. Assume DPT of the coil 6^0C.

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CODE: 13EC4027   SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017

DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time: 3 Hours   Max Marks: 70

PART-A

ANSWER ALL QUESTIONS   [1 x 10 = 10 M]

1. a) Define Digital image
   b) Specify the elements of DIP system
   c) Mention any two properties of 2D FFT.
   d) What are the applications of transform?
   e) List the 2 categories of image enhancement.
   f) Differentiate linear spatial filter and non-linear spatial filter
   g) What is Image Restoration
   h) What do we mean by labelling an image?
   i) How can we divide an image into uniform regions ?
   j) Why segmentation is useful ?

PART-B

Answer one question from each unit   [5x12=60M]
UNIT-I

2. (a) Describe the fundamental steps in image processing?   [6 M]
   (b) Explain the basic Elements of digital image processing   [6 M]
                              (OR)
3. (a) Explain how an image is acquired from the scanner   [4 M]
   (b) Explain the concepts of sampling and quantization with neat diagram   [8 M]

UNIT-II

4. (a) Find the DCT transform and its inverse for 2X2 image [3 6; 6 4].   [7 M]
   (b) Explain Discrete cosine transform in detail   [5 M]
                              (OR)
5. (a) Explain Walsh Transform with suitable equations   [6 M]
   (b) State and prove the convolution property of 2D FFT   [6 M]

UNIT-III

6.   With the help of block diagram, discuss the principle of Homomorphic filtering   [12M]
                              (OR)
7. (a) Explain Spatial Filtering   [8 M]
   (b) Explain Histogram Equalization   [4 M]

<u>**UNIT-IV**</u>

8. (a) What is the linear least mean square error solution of the image restoration   [6 M]
         problem
    (b) Explain in detail about full colour image processing.   [6 M]
                                          (OR)
9. (a) Describe Weiner filter for Image Restoration   [7 M]
    (b) Explain the concept of Pseudo colour image processing in detail   [5 M]

<u>**UNIT-V**</u>

10. (a) Explain in detail Edge linking and boundary detection through local or Hough   [6 M]
          transform.
     (b) Explain Error free compression   [6 M]
                                          (OR)
11. (a) Classify image segmentation algorithms   [6 M]
     (b) Explain Lossy compression   [6 M]

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017

UML AND DESIGN PATTERNS
(Computer Science & Engineering)

Time: 3 Hours   **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) Why UML is called as a language when UML is a bunch of diagrams?
    b) What is object oriented design?
    c) What is interaction?
    d) What kind of relationship exists between a use case and collaboration?
    e) How to model exceptions in UML?
    f) What are the uses of deployment diagrams?
    g) What is a design pattern?
    h) What does *Model* represent in MVC?
    i) What are the uses of abstract factory design pattern?
    j) When to use chain of responsibility design pattern?

PART-B

Answer one question from each unit   **[5x12=60M]**
UNIT-I

2. a) With a neat sketch, explain software development life cycle.   8M
    b) What is a model? Explain importance of modelling.   4M
                                    (OR)
3. a) Explain extensibility mechanisms in UML.   6M
    b   What is a class diagram? Draw the class diagram for School Information System.   6M
UNIT-II

4. a   Compare sequence and collaboration diagrams.   6M
    b   With suitable example, explain a swim lane.   6M
                                    (OR)
5. a   What is a sequence diagram? Explain the properties of it.   6M
    b   What is a use case diagram? Draw the use case diagram for online bookshop   6M
        system.
UNIT-III

6. a   What is an event? Explain how to model different kinds of events in UML?   6M
    b   What is a deployment diagram? Draw the deployment diagram for Library system   6M
                                    (OR)
7. a   Distinguish between a process and thread. Explain how to model processes and   6M
        threads in UML?
    b   What is a component diagram? Write properties and common uses of component   6M
        diagrams.

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UNIT-IV

8.   Using a general example, explain how design patterns can be used to solve a problem?   12M

(OR)

9.   What are the advantages of design patterns? Explain how to describe a design pattern?   12M

UNIT-V

10.   a   Write the structure of Abstract Factory pattern and explain the participants that participate in it.   6M

     b   Explain how to implement Abstract Factory pattern.   6M

(OR)

11.   Explain in detail Bridge pattern   12M

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CODE: 13IT4009   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech I Semester Regular & Supplementary Examinations, October-2017

UNIX PROGRAMMING
(Information Technology)

Time: 3 Hours   **Max Marks: 70**

PART-A
ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) What is the use of umask command?
   b) Which command is used to display the characteristics of a process?
   c) List the functionalities of shell.
   d) Differentiate between input and output redirection.
   e) Define system call.
   f) Differentiate between dup and dup2.
   g) What is a zombie process?
   h) Write the use of pause function.
   i) What is the use of semaphore in IPC?
   j) Define a message queue.

PART-B
Answer one question from each unit   **[5 x 12=60M]**

UNIT-I

2. a) With a neat diagram, explain the architecture of UNIX operating system.   [6 M]
   b) Discuss the following commands with syntax.   [6 M]
   i) grep   ii) tee   iii) finger

(OR)

3. a) Discuss briefly UNIX file system structure.   [6 M]
   b) Explain the concept of security by file permissions. Discuss in detail   [6 M]

UNIT-II

4. a) What are wild cards? Explain the shells wild cards with example.   [6 M]
   b) Write a shell script to display all the numbers that are divisible by 3 and 5 both within a particular range.   [6 M]

(OR)

5. a) Discuss about control structures in shell.   [6 M]
   b) What is shell programming? Write a shell script to create a menu which displays list of files and contents of a file.   [6 M]

UNIT-III

6. a) Explain some I/O system calls with suitable examples.   [6 M]
   b) Discuss about UNIX directory maintenance.   [6 M]

(OR)

7. a) What is a stream? Explain standard streams and file descriptors.   [6 M]
   b) Differentiate between system calls and library functions with example.   [6 M]

UNIT-IV

8. a) What is a process? How to create and destroy processes in UNIX. Show examples. [6 M]
   b) What are signals? Give the classification of signals in the system V UNIX system. [6 M]

(OR)

9. a) What is a Daemon? What is "ps" command for? How would you kill a process? [6 M]
   b) What is an advantage of executing a process in background? How do you execute one program from within another? What are various IDs associated with a process? [6 M]

UNIT-V

10. a) Differentiate between a named pipe and unnamed pipes. Discuss pipe system calls. [6 M]
    b) Explain how semaphore is used for IPC with a suitable program. [6 M]

(OR)

11. a) What is IPC? What are the models of IPC? Differentiate between uncast and multicast IPC. Write the operations provided in IPC. [6 M]
    b) Write a program which will demonstrate the use of message queue for IPC. [6 M]