

**FACULTY OF ENGINEERING****B.E. 3/4 (Civil) II – Semester (Suppl.) Examination, December 2016****Subject: Water and Waste Water Engineering****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Enumerate the advantages of using free chlorine as a disinfectant. 2
- 2 Discuss the factors which affect the rate of demand. 3
- 3 Why is the population forecast necessary in the design of public water supply scheme? 3
- 4 Discuss the process of Coagulation and Flocculation. 4
- 5 Define BOD and TOC. 3
- 6 List out the functions of flushing tanks. 3
- 7 Sketch the schematic diagram of a typical wastewater treatment system. 3
- 8 State the various objectives and types of screens. 2
- 9 Give the classification of Oxidation Ponds and explain about any one. 2

**PART – B (50 Marks)**

- 10 a) What are the different types of pipes commonly used in water supply system? Discuss merits of each. 5
- b) Explain in detail about physical and bacteriological analysis of water. 5
- 11 a) A rectangular sedimentation basin is to handle 15 million litres / day of raw water. A detention basin of width of length ratio of 1/3 is proposed to trap all particles larger than 0.04 mm in size. Assuming a relative density of 2.65 for the particles and 20°C as the average temperature, compute the basin dimensions. If the depth of the tank is 3.5 m, calculate the detention time. 5
- b) Describe with a neat sketch the working of a rapid sand filter (gravity type). What are its advantages over the slow sand filter? 5
- 12 a) A circular pipe of cast iron is flowing full with a velocity of 2 m/s carries a discharge of 2400 ℓ/s. Find the required grade and dia for the sewer. 5
- b) Explain in detail about storm water sewers and their estimation. 5
- 13 Design a grit chamber for a city of 3.5 lakh population with a combined sewerage system, water supply rate is 140 ℓ/d on an average basis. Grit concentration is 45 mg/L grit of 0.2 mm size and above with specific gravity of 2.65 is to be removed. Take temperature of 20°C. 10
- 14 a) Discuss in detail the working principle of septic tank and its design parameters. 5
- b) Enumerate the objectives of sludge treatment. 5
- 15 a) Describe the source and composition of solid wastes. 5
- b) How sewage pumps are different as compared to pumps for water supply? 5
- 16 Write short notes on the following:
  - a) Infiltration galleries 3
  - b) Break point chlorination 3
  - c) Secondary clarifier. 4

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## FACULTY OF ENGINEERING

**B.E. 3/4 (EEE) II-Semester (Suppl.) Examination, December 2016**

**Subject : Switch Gear and Protection**

**Time : 3 hours**

**Max. Marks : 75**

**Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.**

### PART – A (25 Marks)

- |  |   |
|--|---|
| 1 Classification of Relays.  | 2 |
| 2 Define PSM and TSM.  | 3 |
| 3 What is reactance relay, draw the operating characteristics of a reactance relay?  | 2 |
| 4 How amplitude comparator can be converted to phase comparator?                     | 3 |
| 5 Brief about protection of earthing transformer.                                    | 3 |
| 6 What is the need of circuit breaker? Classify different types of circuit breakers. | 3 |
| 7 What are the advantages of numerical relays over static relays?                    | 2 |
| 8 What is current chopping?  | 2 |
| 9 What are the advantages of SF6 circuit breaker over other circuit breakers?        | 3 |
| 10 Explain protection angle.   | 2 |

### PART – B (50 Marks)

- |   |   |
|---|---|
| 11 a) With neat diagram, explain protection scheme for parallel feeders.  | 5 |
| b) Derive and explain the expression for torque developed in an induction relay with relevant diagram.  | 5 |
| 12 a) What is amplitude comparator? Explain circulating current type rectifier bridge amplitude comparator with relevant diagram.                       | 6 |
| b) Discuss time bias type phase comparator with neat diagram.   | 4 |
| 13 a) What is Buchholz relay? Explain how it is useful for protection of transformer in an electric power system with neat diagram.                     | 6 |
| b) Discuss in detail generator-transformer unit protection.   | 4 |
| 14 a) A circuit breaker is rated as 1500A, 15000 MVA, 33 KV, 3 seconds, 3-phase oil circuit breaker. Calculate  |   |
| i) Rated normal current      ii) Breaking capacity      iii) Rated symmetrical breaking current      iv) Rated making current      v) Short time rating |   |
| vi) Rated service voltage   | 6 |
| b) Write short notes on Arc-quenching phenomenon in a circuit breaker.  | 4 |
| 15 a) Explain the necessity of ground wire in an overhead line and also how it protect overhead lines against direct lightning strokes.                 | 5 |
| b) What is insulation coordination?   | 5 |
| 16 Write short notes on :   |   |
| i) Distance relays and R-X diagram.   | 3 |
| ii) Percentage differential protection of transformer   | 3 |
| iii) Peterson coil  | 4 |
| 17 a) Explain different types of lighting arrestors.  | 6 |
| b) Brief about working principle of SF6 circuit breaker and their advantages and disadvantages.   | 4 |

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**FACULTY OF ENGINEERING****B.E. 3/4 (Inst.) II – Semester (Suppl.) Examination, December 2016****Subject: Biomedical Instrumentation****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- |   |   |
|---|---|
| 1 Define Tachycardia and Bradycardia.                                 | 2 |
| 2 Draw the block diagram of basic electronic recording system.        | 3 |
| 3 Define plethysmograph.  | 2 |
| 4 Explain briefly the origin of first and second heart sounds.        | 3 |
| 5 Write the principle of colorimeter.                                 | 2 |
| 6 Which nerve carries signal from brain to SA node?                   | 2 |
| 7 Why endoscope is called fluoroscope? Define otoscope.               | 3 |
| 8 Define microshock and macroshock.                                   | 3 |
| 9 List any six characteristics of any medical instrumentation system. | 3 |
| 10 Write any two applications of flurometry.                          | 2 |

**PART – B (50 Marks)**

- |  |    |
|--|----|
| 11 a) Explain in detail Heart Lung machine with neat sketch.   | 6  |
| b) What are the basic requirements of bio amplifier?           | 4  |
| 12 Explain 10-20 electrode system in EEG.                      | 10 |
| 13 a) Write general features of display systems.               | 6  |
| b) Explain microphones for phonocardiography.                  | 4  |
| 14 a) Write the advantages and disadvantages of Laser surgery. | 5  |
| b) Explain Cine Angiogram.                                     | 5  |
| 15 a) Write the specifications of ECG recorder.                | 6  |
| b) Explain how noise problems are eliminated in ECG recording. | 4  |
| 16 a) Explain Riva Rocci method.                               | 5  |
| b) Explain the generation of X-rays.                           | 5  |
| 17 Write a short note on:                                      |    |
| a) Holter monitoring   | 5  |
| b) Electrophoresis.  | 5  |

**FACULTY OF ENGINEERING****B.E. 3/4 (ECE) II – Semester (Suppl.) Examination, December 2016****Subject: Electronic Instrumentation****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- |    |  |   |
|----|--|---|
| 1  | Define accuracy, precision and resolution.   | 3 |
| 2  | What are the three general classes of errors in the measurement?   | 2 |
| 3  | What are the different factors that affect the selection of a transducer?  | 2 |
| 4  | Under what conditions is a dummy strain guage is used? And what is the function of the guage.  | 3 |
| 5  | A capacitive transducer consists of two plates of diameter 2 cm each, separated by an air gap of 0.25 mm. find the displacement sensitivity. | 3 |
| 6  | what is a thermocouple and a thermopile? State the applications of each.   | 2 |
| 7  | Differentiate between sound pressure level and sound power level.  | 2 |
| 8  | What is meant by spectrum analysis? List out functions of a spectrum analyzer.   | 3 |
| 9  | What are resting and action potentials? Show the waveform of action potential.   | 3 |
| 10 | What are the different types of display modes in Ultrasonic Imaging System?  | 2 |

**PART – B (50 Marks)**

- |       |   |   |
|-------|---|---|
| 11 a) | Enumerate types of errors that are likely to occur in a measurement and show how such error can be minimized and evaluated.       | 5 |
| b)    | Explain in detail about various quality management standards.   | 5 |
| 12 a) | Compare Piezo electric, photo conductive, photo voltaic and photo emissive transducers.   | 5 |
| b)    | Explain in detail the construction and working of LVDT with necessary diagrams.   | 5 |
| 13 a) | What is the signification of IEEE bus system? Draw the block diagram for sampling oscilloscope and explain its operation.         | 5 |
| b)    | Give the difference between MSO and DSO. Draw the block diagram for digital LCR meter and explain its operation.                  | 5 |
| 14 a) | What is hygrometer? Draw the block diagram for harmonic distortion analyzer and explain its operation.                            | 5 |
| b)    | What is meant by spectrum analysis? Compare it with time domain analysis.   | 5 |
| 15 a) | What are the advantages of dual slope DVM over ramp type DVM? Draw the block diagram for ramp type DVM and explain its operation. | 5 |
| b)    | What are resting and action potentials and show their wave forms?   | 5 |
| 16 a) | Compare Ultrasonic and Magnetic Resonance Imaging systems.  | 5 |
| b)    | With a neat block diagram, explain the principle of operation involved in ECG machine.  | 5 |
| 17    | Write short notes on:   |   |
| a)    | Strain gauges   | 5 |
| b)    | X-ray machines.   | 5 |

**FACULTY OF ENGINEERING****B.E. 3/4 (M/P) II-Semester (Suppl.) Examination, December 2016****Subject : Refrigeration and Air Conditioning****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- 1 List the advantages of secondary refrigerants. 2
- 2 Distinguish between open air and dense air refrigeration system. 3
- 3 Explain sub-cooling and super heating in vapour compression refrigeration system. 3
- 4 Explain few applications of low temperature refrigeration. 2
- 5 Name the components used in steam jet refrigeration system. 2
- 6 Explain working principle of Peltier effect. 3
- 7 What is the difference between wet bulb temperature and thermodynamic wet bulb temperature? 3
- 8 What are the important considerations in the designing of air conditioning system? 2
- 9 What is a psychrometer? Explain about any one. 3
- 10 Write a short note on factors effecting comfort air conditioning. 2

**PART – B (50 Marks)**

- 11 A simple air refrigeration system is used for an aircraft to take a load of 20 TR. The ambient pressure and temperature are 0.9 bar and 22<sup>0</sup>C respectively. The pressure of air is increased to 1 bar due to isentropic ramming action. The air is further compressed in a compressor to 3.5 bar and then cooled in a heat exchanger to 72<sup>0</sup>C. Finally, the air is passed through the cooling turbine and then it is supplied to the cabin at pressure of 1.03 bar. The air leaves the cabin at a temperature of 25<sup>0</sup>C. Assuming the isentropic efficiencies of the compressor and turbine as 80 percent and 75 percent respectively, find 1) Power required to take the load in the cooling cabin 2) C.O.P. of the system. 10

Take  $C_p = 1.005 \text{ KJ/kg K}$  ; and  $\gamma = 1.4$

- 12 A food storage chamber requires a refrigeration system of 12 TR capacity with an evaporator temperature of  $-8^{\circ}\text{C}$  and condenser temperature of  $-30^{\circ}\text{C}$ . The refrigerant R-12 is sub cooled by  $5^{\circ}\text{C}$  before entering to the throttle valve, and the vapour is superheated by  $6^{\circ}\text{C}$  before entering to the compressor. If the liquid and vapour specific heat are 1.235 and 733 kJ/KH k respectively, find : 1) Refrigerating effect per kg 2) mass of refrigerant circulated per minute 3) C.O.P. (10)

The relevant properties of the refrigerant R-12 are given below :

Saturation Temperature	Enthalpy, kJ/kg		Entropy kJ/kg K	
	Liquid	Vapour	Liquid	Vapour
-8	28.70	184.06	0.1148	0.7007
30	64.59	199.62	0.2400	0.6853

- 13 a) Explain with neat sketch the working of Electrolux refrigerator and list the major field applications of this system. 5  
 b) Discuss about "cryogenics" and list the advantages, limitations and applications. 5
- 14 The humidity ratio of atmospheric air at  $28^{\circ}\text{C}$  dry bulb temperature and 760mm of mercury is 0.016 kg/kg of dry air. Determine by using psychometric relations : 10
- 1) Partial pressure of water of water vapour
  - 2) Relative humidity
  - 3) Dew point temperature
  - 4) Specific enthalpy
  - 5) Vapour density
- 15 The following data refer to a space to be air conditioned : 10
- Inside conditions =  $25^{\circ}\text{C}$  DBT and 50% RH  
 Out-door conditions =  $22^{\circ}\text{C}$  DBT and 70% RH  
 Room sensible heat gain = 20 kW  
 Room latent heat gain = 5 kW  
 By-pass factor for the cooling coil = 0.1

The return air from the space is mixed with the outside air before entering the cooling coil in the ratio of 4:1 by mass. Determine a) apparatus dew point temperature b) condition of air entering and leaving the coil c) dehumidified air quantity d) fresh air mass flow and volume flow rate and e) total refrigeration load on the air conditioning plant.

- 16 a) Derive COP for steam jet refrigeration system with T-S and h-s plot. 5  
 b) Describe with a sketch the Boor-Strap cycle of Air-Craft Refrigeration. 5
- 17 a) Differentiate between Central and Unitary air conditioning system. 5  
 b) Discuss about ASHRAE comfort chart. 5

**FACULTY OF ENGINEERING****B.E. 3/4 (AE) II-Semester (Supplementary) Examination, Nov. / Dec. 2016****Subject : Automotive Air-Conditioning****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- |  |   |
|--|---|
| 1 Define a) air-conditioning b) dew point temperature                | 3 |
| 2 What is a psychrometer? List out different types of psychrometers. | 3 |
| 3 Why ducts are used in air-conditioning systems?                    | 2 |
| 4 What is adiabatic chemical dehumidification?                       | 3 |
| 5 Define by-pass factor of cooling load.                             | 2 |
| 6 Write the chemical formulae for R-12 and R-134.                    | 3 |
| 7 What are the substitutes of CFC refrigerants?                      | 2 |
| 8 Explain the working of a capillary tube in a refrigeration system. | 3 |
| 9 What is the difference between dry air and atmospheric air?        | 2 |
| 10 What is meant by 1 ton of refrigeration?                          | 2 |

**PART – B (50 Marks)**

- |   |        |
|---|--------|
| 11 The humidity ratio of atmospheric air at 28°C DBT and 760mm of mercury is 0.016 kg / kg of dry air. Determine i) Partial pressure of water vapour ii) relative humidity iii) dew point temperature iv) vapour density and v) specific enthalpy.  | 10     |
| 12 With neat sketch, explain about summer and winter air-conditioning systems.  | 10     |
| 13 Explain with neat sketches, different types of compressors used in air-conditioning units.   | 10     |
| 14 Discuss in brief testing, diagnosis and trouble shooting of air conditioning system.   | 10     |
| 15 a) Write short notes on control systems for car air-conditioner.<br>b) Adiabatic mixing of two air streams.  | 5<br>5 |
| 16 A small office hall of 25 persons capacity is provided with summer air conditioning system with the following data :<br>Outside conditions = 34°C DBT and 28°C WBT ; Inside conditions = 24°C DBT and 50% RH ; Volume of air supplied = 0.4 m <sup>3</sup> /min./person ; Sensible heat in room = 125600 kJ/h ; Latent heat load in room = 42000 kJ/h. Find the sensible heat factor of the plant. | 10     |
| 17 a) Explain air conditioning load on engine performance<br>b) Describe air conditioning system with a neat schematic diagram  | 5<br>5 |

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**FACULTY OF ENGINEERING****B.E. 3/4 (CSE) II – Semester (Suppl.) Examination, December 2016****Subject: Web Programming and Services****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 What is the difference between cellpadding and cellspacing attributes? 2
- 2 Write differences between general and parameter entities. 3
- 3 Write java script code to greet the user based on time with good morning, good afternoon and good evening. 3
- 4 What is URL rewriting and cookie? 2
- 5 Write steps involved in lifecycle of a Filter. 3
- 6 How include directive will differ from include action tag? 2
- 7 What is connection pooling? 2
- 8 List out different JDBC data sources. 3
- 9 What is common Type System? 2
- 10 Give the architecture of CLR. 3

**PART – B (50 Marks)**

- 11 a) Write XHTML code to create this table. 5
 

3/4 II-Semester			
Subjects	CN	WPS	OOSD
Marks	100	100	100
Credits	2	1	2
- b) Write java script program to print today/s date and time. 5
- 12 a) Write differences between SAX approach and DOM approach. 3
- b) Create and XSL style sheet for one car element of the XML document of (model, year, color, engine, number-of-doors, transmission – type and accessories). Make sample data for at least 5 cars. 7
- 13 a) Give the architecture of J2EE and explain. 5
- b) What is servlet? Explain different life cycle methods of a servlet. 5
- 14 a) Illustrate deployment descriptor with an example. 5
- b) Explain JSP design strategies. 5
- 15 a) What is the use of Java Mail? Explain essential protocols used in Java Mail. 5
- b) Explain different types of drivers used in JDBC. 5
- 16 a) Explain C# program structure with an example. 5
- b) Explain web controls in ASP.NET. 5
- 17 Write short notes on: 10
  - a) Java Mail classes.
  - b) .Net framework services.

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**FACULTY OF INFORMATICS****B.E. 3/4 (IT) II – Semester (Suppl.) Examination, December 2016****Subject: Data Warehousing & Data Mining (Elective – I)****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Define KDD process? (2)
- 2 What are major issues in Data Mining? (3)
- 3 Differentiate between Star and Snowflake schema? (2)
- 4 What is Concept Hierarchy? (2)
- 5 What are different types of Data Warehouse models? (2)
- 6 What are different approaches to mining multilevel association rules? (3)
- 7 How does tree pruning works? What are two common approaches used? (3)
- 8 List out different approaches for Model based clustering methods? (3)
- 9 What is sequential pattern mining? (2)
- 10 What is Information Retrieval? What are basic measures used for Text retrieval? (3)

**PART – B (50 Marks)**

- 11 a) Explain the architecture of typical Data Mining system? (5)  
b) Explain Data Transformation in details? Give some example? (5)
- 12 a) Draw and explain briefly a 3-tier Data Warehouse architecture? (5)  
b) Explain about Data Warehouse Back-End Tools and Utilities? (5)
- 13 a) Explain briefly Apriori algorithm? (5)  
b) How might the efficiency of Apriori be improved? Explain in detail? (5)
- 14 a) Briefly outline the major steps of decision tree classification? (5)  
b) Explain about Naïve Bayesian Classification? (5)
- 15 a) Given two objects represented by the tuple(22,1,42,10) and(20,0,36,8) (5)  
i) Compute Euclidian Distance between two objects.  
ii) Compute Manhattan Distance between two objects  
iii) Compute Minkowski Distance between two objects at  $q=3$   
b) What is clustering? Describe Partitioning Clustering methods? (5)
- 16 Why is Outlier mining important? Briefly describe the different approaches? (10)
- 17 Write short note on: (10)  
a) Mining Time Series Data  
b) Spatial Data Mining  
c) Text Mining.

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**FACULTY OF INFORMATICS****B.E. 3/4 (IT) II – Semester (Suppl.) Examination, December 2016****Subject: Computer Graphics (Elective – I)****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 What is meant by homogeneous transformation? 2
- 2 What is meant by Rasterization? 2
- 3 Explain open GL primitives and attributes. 3
- 4 Write open GL transformation matrix for scaling and rotation. 3
- 5 What is anti-aliasing? 2
- 6 List the properties of Bazier curves. 3
- 7 State parametric continuity conditions. 3
- 8 What is an octree? 2
- 9 What is the matrix for parallel projection? 3
- 10 What is a viewing transformation? 2

**PART – B (50 Marks)**

- 11 a) Explain the concept of programmable pipelines.  
b) Explain synthetic camera model.
- 12 a) Find the matrix transformation for the polygon  $V_1 (1,1) V_2 (3,1) V_3 (3,3) V_4 (1,3)$  to half its size and center remains at same position. Center is at (2,2).  
b) Show that scaling performed by rotation is not commutative.
- 13 a) Give an algorithm for Hidden Surface removal.  
b) Discuss about polygonal shading.
- 14 a) Describe Bresenham's line algorithm with an example.  
b) Explain any one polygon clipping algorithm.
- 15 a) How curves and surfaces are generated using Bazier curves? Explain.  
b) Explain open scene graph.
- 16 a) Explain about programming event driven input.  
b) Explain phong lighting model.
- 17 Write short notes on:
  - a) Three dimensional primitives
  - b) Line clipping
  - c) B-Spline curves properties.

**FACULTY OF INFORMATICS****B.E. 3/4 (IT) II – Semester (Suppl.) Examination, December 2016****Subject: Software Testing (Elective – I)****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- |    |   |   |
|----|---|---|
| 1  | What are different states of bug?                                 | 2 |
| 2  | What are the benefits of early testing?                           | 2 |
| 3  | Differentiate between effective and exhaustive testing.           | 3 |
| 4  | Define static testing.  | 2 |
| 5  | What are different types of errors detected by black box testing? | 3 |
| 6  | Differentiate between verification and validation.                | 3 |
| 7  | What is the role of invariants in class testing?                  | 2 |
| 8  | What are source code testing utilities in UNIX?                   | 2 |
| 9  | What is Regression Testing?                                       | 3 |
| 10 | What are different categories of TSL function?                    | 3 |

**PART – B (50 Marks)**

- |    |  |    |
|----|--|----|
| 11 | a) What are the principles of software testing? What are guidelines for designing a good test plan?  | 5  |
|    | b) Is software testing as a process? Justify?  | 5  |
| 12 | a) Explain different stages of STLC. What is the use of Test Strategy matrix?  | 5  |
|    | b) What are adverse effects on a project, if verification is not performed? Discuss the goals of verification in a project.                      | 5  |
| 13 | A program calculate the GCD of three numbers in range [1.50], design test cases for the program using BVC, robust testing and worst case method? | 10 |
| 14 | a) Briefly outline the inspection process? What are different benefits of inspection process?  | 5  |
|    | b) Explain different types of acceptance testing.  | 5  |
| 15 | a) Explain test plan hierarchy?  | 5  |
|    | b) What is the need for S/W measurement? Discuss various types of software metrics.  | 5  |
| 16 | a) what are different challenges in testing for web based software?  | 5  |
|    | b) List out the quality of aspects of web site and perform performance testing on it?  | 5  |
| 17 | Write short note on:   |    |
|    | a) Win Runner  |    |
|    | b) J Meter.  |    |

## FACULTY OF INFORMATICS

**B.E. 3/4 (I.T.) II – Semester (Suppl.) Examination, December 2016**

**Subject: Digital Instrumentation and Control (Elective – I)**

**Time: 3 Hours**

**Max.Marks: 75**

**Note: Answer all questions from Part A. Answer any five questions from Part B.**

### PART – A (25 Marks)

- |    |   |   |
|----|---|---|
| 1  | Define accuracy with respect to process control   | 2 |
| 2  | What is Ramp ADC?   | 3 |
| 3  | Temperature was measured in 5 locations in a room. The values obtained are 20°C, 19.5°C, 21°C, 18°C and 22°C. Calculate arithmetic mean and standard deviation. | 2 |
| 4  | What are load cells?  | 3 |
| 5  | List 5 analog signal conditioning circuits using operational amplifiers.  | 3 |
| 6  | List different control value types.   | 2 |
| 7  | A 10 bit DAC uses a 10V reference. Determine the resolution.  | 3 |
| 8  | List out the field bus types.   | 2 |
| 9  | Draw the diagram for process control system.  | 2 |
| 10 | Distinguish between direct and reverse action with respect to controller.   | 3 |

### PART – B (5x10 = 50 Marks)

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|----|--|----|
| 11 | a) Distinguish between human-aided and automatic control.  | 5  |
|    | b) Draw the typical first order response curve and explain it.   | 5  |
| 12 | a) Explain the procedure for design of a temperature transducer.   | 5  |
|    | b) A driver circuit is used as analog signal conditional circuit. $R_1 = 10k\Omega$ . A sensor is used as $R_2$ . Its resistance varies between 2 to $10\Omega$ . A voltage source of 10V is connected to $R_1$ . Output is taken across the sensor. Find the minimum voltage across the sensor and the range of power dissipated by the sensor ( $R_2$ ). | 5  |
| 13 | Explain the following control system parameters in detail:   | 10 |
|    | i) Error   |    |
|    | ii) Cycling  |    |
| 14 | a) Describe the derivative control mode.   | 5  |
|    | b) Write the steps to develop a PLC program for a ladder diagram.  | 5  |
| 15 | With neat diagram explain the function and use of strain gauges. Derive the expression for gauge factor. What are its applications?  | 10 |
| 16 | a) Draw the ladder diagram symbols.  | 5  |
|    | b) Explain the functions of an operation of evaluator with the help of ladder diagram.   | 5  |
| 17 | Write short notes on the following:  |    |
|    | a) Accuracy and linearity  | 4  |
|    | b) Control loop stability  | 3  |
|    | c) Data logging.   | 3  |

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