

FACULTY OF ENGINEERING**B.E. 3/4 (Civil) II – Semester (Suppl.) Examination, January 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 Write any three factors considered in the planning of a water supply scheme for a town or a city 2
- 2 If the average daily consumption of water for a town is 24 million litres, the maximum hourly demand of water will be _____ 2
- 3 For a water sample having a total hardness of 200 mg/lit as CaCO_3 and alkalinity of 250 mg/lit as CaCO_3 , then carbonate hardness is _____ and non carbonate hardness is _____ 2
- 4 The presence of excess amount of nitrates in drinking water may cause a disease called _____ and safe permissible limit of nitrates in domestic water supplies is _____ 2
- 5 Define surface loading or overflow rate for a sedimentation tank. Give its expression and also the expression for detention time for a continuous flow type sedimentation tank 3
- 6 The suitable layout of distribution system for a city with irregular growth pattern and for a city with roads of rectangular pattern are _____ and _____ 2
- 7 In a BOD test, 1.0 ml of raw sewage was diluted to 100 ml and the dissolved oxygen (DO) concentration of the diluted sample at the beginning was 7 ppm and it was 4 ppm at the end of 5-day incubation at 20°C . The BOD of the raw sewage will be _____ 3
- 8 Define self cleansing velocity and now scouring velocity in sewers, give their significance in the design of sewers 3
- 9 Name three sewerage treatment units which work on anaerobic decomposition of organic matter 3
- 10 Define BOD and COD, high COD to BOD ratio of an organic pollutant represents _____ 3

PART – B (5x10 = 50 Marks)

- 11 a) The populations of the past three successive census of a city are as given below:

Census year	1951	1971	1991
Population	40,000	1,00,000	2,80,000

Determine the expected population of the city for the year 2021 by decrease rate of growth method and logistic method. 6

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- b) Explain Hardy cross method used for pipe network analysis in water distribution system. 4
- 12 a) Explain the importance of chemical and bacteriological analysis of water used for domestic purpose. 5
- b) Find the settling velocity of a discrete particle in water under condition when Reynold's number is less than 0.5. The diameter and specific gravity of the particle is 0.05 mm and 2.65 respectively. Water temperature is 20°C at which kinematic viscosity of water is 1.01 mm²/s. 5
- 13 a) A 350 mm diameter sewer is to flow at 0.35 depth on a grade ensuring a degree of self cleansing equivalent to that obtained at full depth at a velocity of 0.8 m/s. Find the required grade, associated velocity and the rate of discharge at this depth. Given manning's rugosity coefficient = 0.014, proportionate area = 0.315, proportionate HMD (r/R) = 0.7705. 7
- b) What are the main differences between the basic principles of design of sewers and water mains? 3
- 14 a) Define and describe the components of primary treatment, secondary treatment and tertiary treatment of wastewater. 5
- b) A high rate of trickling filter is to be designed to treat 15 MLD of sewage to remove 80% of the BOD applied. The BOD of the influent is 180 mg/l. If the circulation ratio is 2 and the depth of the filter is 1.5 m, determine the diameter of the trickling filter. 5
- 15 a) Explain the basic operations involved in the sludge digestion tanks with the help of a flow diagram. 5
- b) Design a septic tank for a small colony of 200 persons provided with a water supply of 200 litres per person per day. Assume D.T. =24 hrs, rate of deposited sludge = 30 lts/capita/year, period of cleaning = 1 year, L/B = 2.5. 5
- 16 a) What do you understand by oxygen-sag-curve? What is the importance of study of reoxygenation and deoxygenation in the problems of stream sanitation? 5
- b) What is meant by coagulation? What are the common coagulants used? Describe the chemical reactions involved and indicate the equations for chemical reactions, the Floc that form. 5
- 17 Write short notes on any three of the following: 10
- Rapid Sand and Slow Sand filters
 - Activated Sludge process
 - Grit chambers and Detritus tank
 - Source and composition of solid waste.

FACULTY OF ENGINEERING**B.E. 3/4 (EEE) II - Semester (Suppl.) Examination, January 2016****Subject : Switch Gear and Protection****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 What do you understand by definite characteristics and inverse characteristics of a relay? (2)
- 2 Brief the structures used in induction relays. (3)
- 3 How are the static relays classified? (3)
- 4 In what way a distance relay is superior to over- current protection? (2)
- 5 Brief about transformer internal faults? (3)
- 6 Why is a harmonic restrained differential relay required to be used for protecting a large size transformer? (2)
- 7 Explain the phenomenon of current chopping in circuit breakers. (3)
- 8 Why asymmetrical breaking current is higher than symmetrical breaking current in a circuit breaker? (2)
- 9 What are the advantages of metal oxide surge arrester over conventional arresters? (3)
- 10 Explain the terms steamer and stepped lader. (2)

PART – B (50 Marks)

- 11 (a) With a neat diagram explain construction and working of induction type directional power relay. (6)
- (b) Explain the concept of time grading in over-current protection system. (4)
- 12 (a) Discuss the effect of are resistance on the performance of different types of distance relays. (5)
- (b) Draw the flow chart for microprocessor based over current relay. (5)
- 13 (a) What type of protective scheme is employed for the protection of a large power transformer against short- circuits? With neat sketches discuss its working principle. (6)
- (b) Discuss the protection employed against loss of excitation of an alternator. (4)
- 14 (a) In a 132kV power system the, L is 10 H and C is 0.02 micro Farads per phase up to the location of the circuit breaker respectively. If the circuit breaker interrupts a magnetizing current of 20 A (instantaneous), current chopping occurs. Determine the voltage which will appear across the contacts of the circuit breaker. Also calculate the value of the resistance which should be connected across the contacts to eliminate the transient restriking voltage. (5)
- (b) Describe the construction, operating principle and application of SF₆. (5)

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- 15 (a) Describe the construction and the operation of valve type lightning arrester. (5)
(b) A 132 kV, three phase, 50 Hz transmission line 200 km long contains three conductors of effective diameter 2.2 cm, arranged in a vertical plane with 4.5 m spacing and regularly transposed. Find the inductance and kVA rating of the Peterson coil in the system. (5)
- 16 (a) Explain what is meant by positive, negative, and zero sequence. Illustrate with diagrams, a system of protection making use of negative sequence currents for the operation of the relays. (6)
(b) Explain, with essential sketches where necessary, the working of an axial air blast circuit breaker. (4)
- 17 (a) Brief about generator transformer unit protection. (5)
(b) Derive the expression for reactance of the Peterson coil in a three phase system. (5)

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

- 1 Mention the general characteristic of Biomedical Instrument devices. (3)
- 2 Mention the advantages of LVDT in Biomedical Applications. (2)
- 3 Mention the principle of EEG. (3)
- 4 Define the various heart sounds in a phonocardiogram. (2)
- 5 Draw and briefly explain the endoscopy. (3)
- 6 State the Doppler principle of blood flow measurement. (2)
- 7 State the principle of Image Intensifier. (3)
- 8 What is the use of auto-analyzer? (3)
- 9 What are the electric Hazards during Bio-electric monitoring? (2)
- 10 What is meant by Holter monitoring? (2)

PART – B (50 Marks)

- 11 (a) Describe the special features of Optical recorder with neat diagram. (6)
(b) Explain the need for carrier amplifier in a biomedical recording system. (4)
- 12 Explain the operating principle with the Block diagram of EMG machine. Mention the design consideration of EMG amplifiers. (10)
- 13 (a) Explain clearly the blood flow measurement using the electromagnetic principle. (5)
(b) Describe Phonocardiography instrumentation in medical applications. (5)
- 14 (a) Write short notes on Emission photometry. (5)
(b) Explain in the working of chromatography with neat diagram. (5)
- 15 Describe the electrical factors governing the hospital design and discuss about equipotential Grounding and earth free monitoring. (10)
- 16 (a) What are 10-20 Electrode system? (5)
(b) Explain the techniques for direct measurement of Blood pressure. (5)
- 17 Write short notes on following: (10)
(a) Thermo-sensitive Recorders
(b) MRI / NMR

FACULTY OF ENGINEERING**B.E. 3/4 (ECE) II – Semester (Supplementary) Examination, January 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 Resolution and Sensitivity. Give examples to each.
- 2 A 0-25 A ammeter has a guaranteed accuracy of 1% of FSR. The current measured by this instrument is 13A. Determine the limiting error in percent.
- 3 Calculate the gauge factor of strain gauge if a 1.5mm diameter conductor that is 24 mm long changes by 1 mm and diameter by 0.02 mm under a compression force?
- 4 Explain the principle of velocity transducer.
- 5 List out the factors for selection of a microphone.
- 6 What method do you suggest to measure the molten metal at temperature of about 1500°C in a mould?
- 7 Mention applications of spectrum analyzer.
- 8 What is SCADA?
- 9 Draw the typical ECG waveform and explain its significance.
- 10 Distinguish resting potential from action potential.

PART – B (50 Marks)

- 11 a) Discuss about elements of ISO and IEEE standards.
b) Differentiate between accuracy and precision, resolution and sensitivity with examples.
- 12 a) Define a transducer. Distinguish between active and passive transducers. Classify the transducers based on the principle of transduction.
b) Explain the principle and operation of photo-conductive, photo-voltaic and photo-emissive transducers. Mention the applications of each.
- 13 a) What is a micro-phone? Explain the different types of microphones in detail.
b) Explain the construction, operating principle of semiconductor thermo meters.
- 14 a) Using the block diagram explain the principle of operation of a swept-super heterodyne spectrum analyzer.
b) Describe the IEEE 488/GPIB interface bus giving the various bus lines and various types of equipment that may be connected.
- 15 a) Draw the diagram of a standard ECG giving nomenclature of the deflections and intervals. What is the importance of T wave? Write brief notes on PR interval.
b) What is EEG? Describe how it can be obtained.
- 16 a) What is a strain-gauge? Explain different types of strain gauges. Mention its applications.
b) Explain with neat schematic how a LVDT can be used for displacement measurement.
- 17 Write short notes on the following :
a) LCR meter
b) Quality management standards

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) II – Semester (Supplementary) Examination, January 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. Air condition and Refrigeration Tables are permitted.

PART – A (25 Marks)

- 1 What are the desirable properties of refrigerants? 2
- 2 Distinguish between Refrigerating Machine, Heat Pump and Heat Engine. 3
- 3 Explain the cycle for the process of under cooling and super heating with T-S & P-H diagram. 3
- 4 What are the advantages and disadvantages cascade system? 2
- 5 Define Peltire and Thompson effect. 2
- 6 Compare vapour absorption system with vapour compression refrigeration system. 3
- 7 Explain the working of sling psychrometer. 3
- 8 Define metabolism. 2
- 9 List the applications of refrigeration in food industry. 3
- 10 Define RSHF and GSHF. 2

PART – B (50 Marks)

- 11 In an open cycle air refrigeration machine, air is drawn from a cold chamber at -5°C and 2 bar and compressed to 11 bar. It is then cooled, at this pressure, to the cooler temperature of 20°C and then expanded in expansion cylinder and return to the cold room. The compression and expansion are isentropic and follows the law $PV^{1.4} = \text{constant}$. Sketch the P-V and T-S diagrams of the cycle and for refrigerant of 25 TR. Find : 1) Theoretical C.O.P. 2) Rate of circulation of air in kg/min. 3) Piston displacement per minute in the compressor and expander ; and 4) Theoretical power per tonne of refrigeration. 10
- 12 A vapour compression refrigerator uses R-12 as refrigerant and liquid evaporates in the evaporator at -15°C . The temperature of this refrigerant at the delivery from the compressor is 15°C , when the vapour is condensed at 10°C . Determine the C.O.P., if 1) There is no under cooling ; and 2) the liquid is cooled by 5°C before expansion by throttling. Take specific heat at constant pressure for the superheated vapour as 0.64 kJ/kg K and that for liquid as 0.94 kJ/kg K . 10
- 13 a) Explain with neat sketch the working of Li-Br vapour absorption refrigeration system and list the major field applications of this system. 5
b) Explain with sketch the working principle pulse tube refrigeration system. 5

- 2 -

14 The following data refer to an air conditioning system for industrial process for hot and wet summer conditions :

Outdoor conditions	= 30°C DBT and 75% RH
Required conditions	= 22°C DBT and 70% RH
Amount of out-door air supplied	= 200 m ³ /min
Coil due point temperature	= 14°C

If the required conditions are achieved by first cooling and dehumidifying and then heating, find :

- 1) The capacity of the cooling coil and by-pass factor
- 2) The capacity of the heating coil and surface temperature of the heating coil if By-pass factor is 0.2.

10

15 The following data refer to summer air conditioning of a restaurant.

Inside design conditions	= 27°C DBT and 21°C WBT
Outside design conditions	= 38°C DBT and 27°C WBT
Sensible heat load	= 126000 kJ/hr
Latent heat load	= 50,400 kJ/hr

The out side air is supplied at the 20 m³ / min directly in to the room through ventilators and by infiltration. The outside air is to be conditioned is passed through a cooling coil which has an apparatus dew point of 12°C and 60% of the total air is re-circulated from the conditioned space and mixed with conditioned air after the cooling coil. Find a) Condition of air after the cooling coil before mixing with recalculated air b) Condition of air entering the restaurant c) Mass of fresh air entering the cooling coil d) By-pass factor of the cooling coil, and e) Total refrigeration load on the cooling coil.

10

16 a) What do you understand by “cryogenics”? Explain few applications. 5

b) Explain the working of ‘Electrolux Refrigerator’ with neat sketch. 5

17 a) Describe with sketch the reduced ambient air cooling system used for aircrafts. 5

b) Discuss about green house effect and alternative refrigerants. 5

FACULTY OF ENGINEERING**B.E. 3/4 (AE) II – Semester (Supplementary) Examination, January 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 the term psychrometry. State its importance in the field of air conditioning. 3
- 2 Define the following properties.
 - i) Degree of saturation
 - ii) By-pass factor
- 3 What is the effect of sensible heat gain? What are the sources of sensible heat gain in air-conditioning room. 3
- 4 Define gross sensible heat factor (GSHF). 2
- 5 State the need of evaporator in refrigeration system. 2
- 6 Distinguish between capillary tube and thermostatic expansion valve. 3
- 7 List the thermodynamic properties of an ideal refrigerants. 3
- 8 List the various automatic temperature control devices. 2
- 9 What is ducting? How it is connected to automotive air-conditioning system. 3
- 10 What are the various Air-conditioning mechanical problems. 2

PART – B (50 Marks)

- 11 Explain the following with sketch
 - i) Cooling and Dehumidification
 - ii) Mixing of two air streams
- 12 Draw a neat sketch of summer air conditioning system and explain its working.
- 13 A hall is to be maintained 24°C DBT, and 60% RH under following conditions.
 Out side conditions = 38°C DBT and 28°C WBT
 Sensible heat load in room = 46.6 kW
 Latent heat load in room = 11.6 kW
 Total infiltrated air = $1200\text{ m}^3/\text{hr}$

 Determine a) Mass flow rate of infiltrated air b) Room sensible heat factor
- 14 Describe the classification of refrigerants stating two examples in each group.
- 15 Explain about automatic controls for air-conditioning system to regulate the temperature inside the vehicle.
- 16 Explain about air-conditioning maintenance and service interms of compressor hums and trips on overload.
- 17 Draw the schematic layout of refrigeration system and explain about each component.

FACULTY OF ENGINEERING**B.E. 3/4 (CSE) II – Semester (Supplementary) Examination, January 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 format of URL? | 2 |
| 2 | Write Java script function to validate phone number. | 3 |
| 3 | What are the advantages of XML schema over DTD's? | 2 |
| 4 | Distinguish between Servlet and Filter. | 3 |
| 5 | Mention different types of Rowset objects. | 2 |
| 6 | What is the difference between JSP include and JSP forward action tags? | 3 |
| 7 | What is postback method in asp.net? | 3 |
| 8 | What is deployment description? | 2 |
| 9 | List the interfaces in Java Mail API. | 3 |
| 10 | What is CTS? | 2 |

PART – B (50 Marks)

- | | | |
|----|---|----|
| 11 | a) Create a form to accept the details of a student : Name, Address, Sex (Male/Female), Electives (Check box), and Branch (chosen from a list box). Provide submit and Reset buttons on it. | 5 |
| | b) Write Java script code to validate the form fields username, password and email id. | 5 |
| 12 | a) Draw the life cycle of Servlet. Explain in detail steps involved in deploying a web application. | 5 |
| | b) What is session tracking? How do we track user sessions with Http session object? | 5 |
| 13 | a) Explain in detail different JSP elements. | 5 |
| | b) Write a program to create iterative custom tag using Tag extension. | 5 |
| 14 | a) Explain different types of JDBC drivers with neat diagrams. | 5 |
| | b) Write the JDBC program to create table, insert the values and display. | 5 |
| 15 | a) Explain in detail the life cycle methods of filter. | 5 |
| | b) Explain the steps involved in securing web application. | 5 |
| 16 | a) Explain the architecture of .NET and how does CLR execute the .NET source code? Explain the steps involved in it. | 6 |
| | b) What is ASP.NET? Explain different controls in ASP.NET with examples. | 4 |
| 17 | Write short notes on : | |
| | a) Java Mail API | |
| | b) WWW | 10 |

FACULTY OF INFORMATICS

B.E. 3/4 (I.T.) II - Semester (Suppl.) Examination, January 2016

Subject : Data Warehousing and Data Mining (Elective-I)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part - A and answer any five questions from Part-B.**PART – A (25 Marks)**

- 1 Present an example where Data mining crucial to success of a business. (3)
- 2 Difference between Data Warehouse and Data Mining. (2)
- 3 Define OLAP operations. (3)
 - (a) Slice (b) Roll-up (c) Drill down
- 4 Why we pre-process the data, give the reasons? (2)
- 5 Describe any three data mining functionalities. (3)
- 6 What is meant by single dimension association rule and multidimension association rule? Give examples. (3)
- 7 What is meant by Accuracy? How do you test the classification accuracy? (3)
- 8 Define (a) spatial datamining (b) Time series data (2)
- 9 Write the advantage of Grid based clustering methods. (2)
- 10 Describe decision tree pruning techniques (2)
 - (i) Pre-pruning (ii) Post-pruning

PART – B (50 Marks)

- 11 (a) Explain Data Integration Techniques. (5)
 - (b) Explain major issues in Data mining. (5)
- 12 (a) Explain the process of KDD with a neat diagram. (6)
 - (b) Explain Min-Max and Z-Score normalization technique. (4)
- 13 Suppose that the data for analysis include the attribute age. The age values for the data tuples are (in increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.
 - (a) What is the mean of the data? What is the median? (2)
 - (b) What is the midrange of the data ? (2)
 - (c) Give the five number summary of the data (6)
- 14 (a) Explain different method for improving the efficiency Apriori Algorithm. (4)
 - (b) Write the FP=Growth algorithm compute the frequent patterns for the following transactional database? Min-sup=60%. (6)

Tid	Item list
T100	C, M, S, B
T200	S, M, A, P
T300	A, M, BP
T400	B, M S

- 15 (a) Explain statistical based outlier detection and deniation based outlier detection. (5)
 - (b) Describe Grid Based clustering methods. (5)
- 16 (a) Explain how to construct a spatial data cube and spatial OLAP. (5)
 - (b) Explain spatial Association and co-location patterns. (5)
- 17 Explain:
 - (a) Text Mining (3)
 - (b) Web mining (4)
 - (c) Multimedia mining (3)

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

- 1 Define flat panels display. In how many ways it has been classified? (3)
- 2 Write about shadow mask method. (2)
- 3 List issues in structuring user dialogues. (2)
- 4 Write about 2D viewing functions. (3)
- 5 Explain about 3D primitives. (3)
- 6 Define animations. (2)
- 7 Define Blending. (2)
- 8 Explain global illuminations. (3)
- 9 Write about types of icons. (3)
- 10 Define projection operations. (2)

PART – B (50 Marks)

- 11 Explain poster method for transformation. (10)
- 12 Explain poster method for transformation.
 - (a) Auto Aliasing (5)
 - (b) Hidden surface removal (5)
- 13 Write about open GL transformation matrix. (10)
- 14 Write about
 - (a) Cube B splines (6)
 - (b) Phong shading (4)
- 15 Discuss picture construction techniques. (10)
- 16 Explain Bresenham's algorithm. (10)
- 17 Write short notes on the following:
 - (a) Modeling in colored cube (6)
 - (b) Area fill Algorithm (4)

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

- 1 Define software testing. What are the different types of testing? (3)
- 2 Define (i) Error (ii) Defect (iii) Bug (3)
- 3 What is verification and validation? (2)
- 4 Mention the different types of testing tools for testing the software. (2)
- 5 What is a software metric? Mention different types of software metrics. (3)
- 6 What is black box testing? What are the different black box testing strategies? (3)
- 7 What is integration testing? (2)
- 8 What is Regression testing? (2)
- 9 What are the uses of silk test? (3)
- 10 What is a Test script language? (2)

PART – B (50 Marks)

- 11 (a) What are the objectives of software testing? What is a test plan? (5)
(b) Explain Boundary – value Testing with an example. (5)
- 12 What is Unit Testing? Explain unit testing in object oriented systems. (10)
- 13 (a) Explain equivalence class testing. (5)
(b) Explain data flow testing. (5)
- 14 (a) What is Alpha and beta testing? Differentiate between them. (5)
(b) What are the different types of applications that can be tested using JMeter. What are its uses? (5)
- 15 (a) What is debugging? Explain. (2)
(b) What are various Testing strategies for testing Web based applications? Explain. (8)
- 16 Consider an application designed for student information system for a university / college perform test for data validation and also functional testing using Win Runner. Explain the different steps to perform the above tasks and the expected results after successful execution of the tests. (10)
- 17 Write short notes on the following: (5)
(a) Validation activities (5)
(b) Source Code Testing utilities in Unix (5)

FACULTY OF INFORMATICS**B.E. 3/4 (I.T.) II - Semester (Suppl.) Examination, January 2016****Subject : Digital Instrumentation and Control (Elective-I)****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Define accuracy with respect to process control. (2)
- 2 Draw the characteristics of an SCR. (2)
- 3 Temperature was measured in 5 locations in a room and the values obtained are 20°C, 19,5°C, 21°C, 18°C, 22°C. Calculate the Arithmetic Mean and Standard deviation. (3)
- 4 List the objectives of a control system. (2)
- 5 List 5 analog signal conditioning circuits using op.amps. (2)
- 6 Write the expression for output-to-input voltage ratio of a high pass filter and draw its characteristics. (3)
- 7 A 10bit DAC uses a 10V reference. Determine the resolution. (2)
- 8 List 2 real time applications of optical sensor. (3)
- 9 What is the function of an actuator? (3)
- 10 Distinguish between direct and reverse action with respect to controller. (3)

PART – B (50 Marks)

- 11 (a) Distinguish between human-aided and automatic control. (5)
(b) With suitable examples explain the process-control block diagram. (5)
- 12 (a) Explain the principle of operation of 3 analog signal conditioning circuits for signal-level and bias changes, linearization, filtering and impedance matching. Give suitable examples wherever possible. (6)
(b) A divider circuit is used as analog signal conditioning circuit. $R_1 = 10k\Omega$. A sensor is used as R_2 . Its resistance varies from 2 to 10Ω . The voltage source of 10V is connected to R_1 . The output is taken across the sensor. Find the minimum and maximum voltage across the sensor and the range of power dissipated by the sensor (R_2). (4)
- 13 (a) What is a sample-and-hold circuit? (2)
(b) Explain the operation of dual-slope ADC and successive approximation type ADC. (4+4)
- 14 Explain the constructional details, characteristics of RTD, thermistor and thermocouples. How the signal conditioning circuits are selected for each applications? (3+3+4)
- 15 With a neat diagram explain the function and use of strain gauges. Derive the expression for the gauge factor. What are its applications? (4+3+3)
- 16 (a) Draw the ladder diagram symbols. (3)
(b) Explain the functions of operation of an elevator with the help of ladder diagram. (7)
- 17 (a) What is the function of controller? Explain the different types of analog composite controller modes. (6)
(b) Define and explain the 3 standard measures of quality in a control system. (4)
