

# AR18

**CODE: 18CET314**

**SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech I Semester Regular & Supplementary Examinations, February-2022**

**BASIC REINFORCED CONCRETE DESIGN**

**(Civil Engineering)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

## **UNIT-I**

- 1 a) Explain working stress method with assumptions. 6 M
- b) Explain limit state design characteristic strength, load and partial safety factors. 6 M

**(OR)**

2. a) What are requirements governing maximum and minimum reinforcement in beams? 6 M
- b) A singly reinforced beam of 250 mm wide and 380 mm deep to the center of tensile reinforcement with 3 bars of 18mm dia. Determine the depth of neutral axis and the maximum moment of resistance use M20 and Fe415. 6 M

## **UNIT-II**

3. a) Design shear reinforcement for a beam 230 mm width and 450 mm effective depth carries a load of 20kN/m over a span of 4m with a tensile reinforcement of 4-16mm. Use M20 and Fe415. 6 M
- b) Explain diagonal tension. 6 M

**(OR)**

4. a) What are T beams and properties of T beam section? 6 M
- b) A T beam of flange width 850mm thickness 100mm rib 275mm depth 475mm. the beam is reinforced with 4 bars of 20mm dia. find ultimate moment of resistance. Use M20 Fe415. 6 M

## **UNIT-III**

5. Design a simply supported slab supported on masonry walls to the following requirements. Clear span=3m, live load=4000N/m<sup>2</sup>. Use M20 and Fe 415. 12 M

**(OR)**

6. Design a RCC slab for a room 4m X 6m. The edge of the slab is simply supported and the corners are not held down. The live load on the slab is 3000 N/m<sup>2</sup>. The slab has a bearing of 150mm on the supporting walls. Use M20 and Fe415. 12 M

## **UNIT-IV**

7. Design a circular column which carries a axial load of 800 kN with helical reinforcement. Use M20 and Fe 415. Perform necessary checks. 12 M

**(OR)**

8. a) Design a short square column subjected to an axial load of 1000 kN. Adopter use M20 and Fe415. 6 M
- b) Briefly explain about short and long columns. 6 M

## **UNIT-V**

9. a) Briefly explain different types of footings and explain reinforcement in footings with neat sketch. 6 M
- b) Write a detailed note on distribution of base pressure. 6 M

**(OR)**

10. A reinforced concrete column of size 450mm x 450mm carries a load of 750kN. The safe bearing capacity of the soil is 250kN/m<sup>2</sup>. Design an isolated column footing with uniform thickness and also M 20grade and Fe415. 12 M

# AR18

**CODE: 18EEE311**

**SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B. Tech I Semester Regular & Supplementary Examinations, February-2022**

## **INTEGRATED CIRCUITS APPALICATIONS**

**(Electrical & Electronics Engineering)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

### **UNIT-I**

1. a) Explain input and output offset voltages with relevant diagrams 6M
- b) List out the characteristics of the ideal op-amp? Draw the pin diagram for 741 op-amp. 6M

**(OR)**

2. a) Describe the function of all the building blocks of an op-amp. 6M
- b) Illustrate the open loop and closed loop operations of an op-amp. 6M

### **UNIT-II**

3. a) Originate the expression for output voltage of inverting summing amplifier using 741 IC and explain its operation. 6M
- b) Explain the operation of Schmitt trigger circuit using 741 op-amp 6M

**(OR)**

4. a) Draw the basic circuit diagram of an op-amp differentiator and explain its operation and stability. 6M
- b) Design an adder circuit using an op-amp to get the output expression as  $V_0 = -(0.1V_1 + V_2 + 10V_3)$ . 6M

### **UNIT-III**

5. a) Illustrate the circuit diagram for first order high-pass filter and derive the expression for lower cut-off frequency of the filter. 6M
- b) Explain the first order low pass filter operation with suitable diagram. 6M

**(OR)**

6. a) Illustrate the circuit diagram for first order low pass filter and derive the expression for higher cut-off frequency of the filter. 6M
- b) Design the first order high pass with a cut-off frequency of 1 kHz. Assume necessary data. 6M

### **UNIT-IV**

7. a) Explain the working of the weighted resistor digital to analog converter and state the features. 6M
- b) Describe the operation of Dual slope analog to digital converter with neat diagrams. 6M

**(OR)**

8. a) Explicate the operation of R – 2R ladder type DAC with neat circuit diagram 6M
- b) Illuminate the operation of Successive Approximation A/D converter using suitable diagrams. 6M

### **UNIT-V**

9. a) Explain the functional block diagram of 555 timer and list out its applications 6M
- b) Describe the application of 555 timer monostable multivibrator as pulse width modulator. 6M

**(OR)**

10. a) With help of suitable sketches, how 555 timer IC can be used as a mono stable multivibrator? 6M
- b) Explain the operation of astable multivibrator using 555 timer. 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****III B.Tech I Semester Regular & Supplementary Examinations, February-2022****APPLIED THERMODYNAMICS****(Mechanical Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

***NOTE: Steam Tables must be supplied in the exam hall*****UNIT-I**

1. a) Briefly explain the formation of steam with the help of T-s and p-v diagrams. 6m
- b) Determine the internal energy of steam at 10 bar for the following conditions: (i) When steam is 0.6 dry (ii) When steam is at 350 °C,  $C_{ps}=2.25$  kJ/kg 6m

**(OR)**

2. a) Briefly explain the basic principles of (i) Reheating and (ii) Regeneration as applied to vapour power cycles. 6m
- b) A reheat cycle operating between 30 bar and 0.04 bar has a superheat and reheat temperature of 450 °C. The first expansion takes place till the steam is dry saturated and then reheat. Neglecting pump work, determine the ideal cycle efficiency. 6m

**UNIT-II**

3. a) Distinguish between Fire tube and Water tube boilers 6m
- b) What is the difference between boiler mounting and accessory? List out different mountings and explain the working of any one mounting used in boilers. 6m

**(OR)**

4. a) Explain the working of Benson boiler with a neat sketch and give the salient characteristics of it. 6m
- b) Explain the following terms as applied to boiler (i) Equivalent Evaporation of water (ii) Boiler efficiency Also derive the expressions for the same. 6m

**UNIT-III**

5. a) What are the different types of nozzles commonly used? Derive the expression for the exit velocity of a nozzle from the fundamentals. 4m
- b) Derive the expression of condition for maximum discharge through nozzles. 8m

**(OR)**

6. a) Define the terms (i) Condenser efficiency (ii) Vacuum efficiency. 4m  
b) The following readings were taken during a test on a condenser: 8m  
Vacuum in the condenser – 700 mm of Hg; Barometer reading – 762 mm of Hg; Temperature of condensation (Steam temperature) =  $35^{\circ}\text{C}$ ; Cooling water circulated = 46,270 Kg/hr; Inlet temperature of cooling water =  $16.7^{\circ}\text{C}$ ; Outlet temperature of cooling water =  $31^{\circ}\text{C}$ ; Condensate collected = 1200 kg/hr; Find: (i) The mass of air present per  $\text{m}^3$  of condenser volume; (ii) The condition of steam entering the condenser and (iii) The vacuum efficiency of the condenser.

**UNIT-IV**

7. a) Differentiate between impulse turbine and reaction turbine. 6m  
b) Steam issues from a nozzles of a De-Laval turbine with a velocity of 1200 m/s. The nozzle angle is  $20^{\circ}$ , the mean blade velocity is 400 m/s and the inlet and outlet angle of blades are equal. The mass of steam flowing through turbine per hour is 900 kg. Calculate (i) Blade angles (ii) Relative velocity of steam entering the blades (iii) Power developed (iv) Blade efficiency. 6m

**(OR)**

8. a) What is degree of reaction? Show that for a 50% of degree of reaction turbine the blades are symmetrical. 6m  
b) What is the necessity of compounding in steam turbines? Explain the working of velocity compounding method with the help of simplified sketch.. 6m

**UNIT-V**

9. a) Explain the difference between open cycle and closed cycle gas turbines. 6m  
b) In a gas turbine plant working on Brayton cycle. The air at inlet is  $27^{\circ}\text{C}$  and 1 bar. The pressure ratio is 6 and maximum temperature of cycle is  $800^{\circ}\text{C}$ . Isentropic efficiency of the compressor and turbine are 0.8 and 0.85 respectively. Find (I) compressor work, (ii) turbine work, (iii) work ratio, (iv) thermal efficiency. 6m

**(OR)**

10. a) Explain the working of Turbojet with the help of a neat sketch. 6m  
b) Define and derive the following terms as applied to jet propulsion units (i) Thrust power (ii) Propulsive power (iii) Propulsive efficiency. 6m

# AR18

**CODE: 18ECE301**

**SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech I Semester Regular & Supplementary Examinations, February, 2022**

**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION  
(Electronics and Communication Engineering)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

## UNIT-I

1. a) Define the terms: a)sensitivity b)Precision c)True value d)Dynamic error. 8M  
b) Derive the expression for shunt resistance in Dc Ammeter? 4M
- (OR)
2. a) Explain about static errors that occur in measurements? 6M  
b) Draw and explain the circuit and operation of shunt type Ohm meter? 6M

## UNIT-II

3. a) Draw and explain the circuit of standard AF signal generator? 4M  
b) Explain how function generator generates sine wave, triangular wave and square wave? 8M
- (OR)
4. a) Explain the working of Harmonic distortion analyser? 6M  
b) Explain the working of Network analyzer? 6M

## UNIT-III

5. a) Explain the working of Dual trace CRO with neat block diagram? 6M  
b) Explain the working of storage oscilloscope with neat block diagram? 6M
- (OR)
6. a) Explain the electronic switch in Dual trace CRO? 4M  
b) Explain the working of Digital storage oscilloscope with neat block diagram? 8M

## UNIT-IV

7. a) Explain the basic principle of Schering bridge and derive the expression to find the value of unknown resistance and capacitance? 7M  
b) Explain with the neat diagram of Anderson bridge? 5M
- (OR)
8. a) Construction the derivation of a wheatstone bridge? 6M  
b) Describe with diagram the operation of Kelvin's bridge. 6M

## UNIT-V

9. a) Explain the working of capacitive transducer? 6M  
b) List the different types of transducers? 6M
- (OR)
10. a) Explain the working of LVDT. 6M  
b) Explain the operation of unbonded strain gauge? 6M

# AR18

CODE: 18CSE312

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Regular & Supplementary Examinations, February-2022

## ADVANCED COMPUTER ARCHITECTURE (Common to CSE & IT)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

### UNIT-I

1. a) List Elements of Modern computer and Explain them in Brief 6M  
b) Explain on which factors the performance of the System depends 6M
- (OR)
2. a) Give and Explain COMA of a Multi-Processor System, Also Give the Architecture 6M  
b) Explain About Distributed Memory Multi Computer Along With its Architecture 6M

### UNIT-II

3. Mention the Basic Six Cache Optimization Techniques and Describe them in Detail 12M
- (OR)
4. a) In Detail Explain the Concept of Small and Simple L1 Cache 6M  
b) Explain Pipelined cache access to increase cache band width Concept. 6M

### UNIT-III

5. a) Explain About Clocking and Timing Control With respect to Linear Pipeline Processors 6M  
b) Explain About a synchronous model of pipeline in detail. 6M
- (OR)
6. a) Explain about Reservation and Latency Analysis 6M  
b) Explain About six Stage Instruction Pipeline with an Example 6M

### UNIT-IV

7. a) Explain About Vector Access Memory Schemes in Detail 6M  
b) Write in detail about omega network routing. 6M
- (OR)
8. a) Explain about different vector instructions briefly. 6M  
b) Elaborate Multi processor Networking Concept in Detail 6M

### UNIT-V

9. a) Explain About Directory based Protocol Approach With respect to Cache Coherence in Detail 6M  
b) Write Short Notes on 6M  
(i) Snoopy Protocol (ii) Message Routing Schemes
- (OR)
10. a) Explain About Dead Lock Virtual Channels 6M  
b) Give and Explain Flow Control Strategies 6M

**OBJECT ORIENTED ANALYSIS AND DESIGN  
(Information Technology)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) Explain the UML architecture in detail. 6M  
b) Explain structural, behavioural, grouping and annotation things. 6M  
(OR)
2. a) Explain the importance of UML structure and provide its advantages and disadvantages 6M  
b) Give the importance of state machine, activity diagram and interaction diagrams with example. 6M

**UNIT-II**

3. a) Explain about UML class notation, provide a suitable example. 6M  
b) Explain class inheritance with suitable example 6M  
(OR)
4. a) Draw a class diagram describing the sales order system by considering all sub components of a class diagram. 6M  
b) Explain the relationships like dependency, association, generalization, and realization. 6M

**UNIT-III**

5. a) Draw an use case diagram for ATM system and explain each and every use cases. 6M  
b) Name and explain the messages used in a System Interaction Diagram. 6M  
(OR)
6. a) What are the Notations of an Activity diagram? Why use Activity Diagram? How to draw an Activity Diagram? When to use an Activity Diagram? 6M  
b) Explain the Sequence diagram with a suitable example which includes all features of it. 6M

**UNIT-IV**

7. a) What are called Well-formed design classes, how can you justify them. 6M  
b) Define interface and write about required and provided interface. 6M  
(OR)
8. a) Explain component based development with example 6M  
b) How to refine analysis relationships. 6M

**UNIT-V**

9. a) Explain MVC architecture in detail. 6M  
b) Explain the types of a state machine diagram by taking simple example. 6M  
(OR)
10. a) Differentiate State Machine vs. Flowchart 6M  
b) Draw Bank ATM behavioural state machine 6M

# AR16

**CODE: 16CE3015**

**SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech I Semester Supplementary Examinations, February, 2022**

**CONCRETE TECHNOLOGY**

**(Civil Engineering)**

**Time: 3 Hours**

**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

## **UNIT-I**

1. a) Explain process of hydration of cement. 7M  
b) Explain different grades of cement. 7M
- (OR)**
2. a) Discuss various types of admixtures with properties. 7M  
b) Explain classification of aggregates. 7M

## **UNIT-II**

3. a) Explain the test for setting time of concrete. 7M  
b) How to measure workability of concrete and explain any one of them. 7M
- (OR)**
4. a) Discuss the effect of time and temperature on workability of concrete. 7M  
b) Discuss whether sea water can be used for concrete or not? 7M

## **UNIT-III**

5. a) Discuss the factors affecting compressive strength of concrete. 7M  
b) Explain maturity concept of concrete. 7M
- (OR)**
6. a) Explain different moduli of elasticity. 7M  
b) Discuss the relation between creep and time. 7M

## **UNIT-IV**

7. a) Explain factors affecting durability of concrete. 7M  
b) Discuss about Acceptance criteria. 7M
- (OR)**
8. Design a concrete mix for characteristic strength of 35MPa at 28 days with a standard deviation of 4MPa. The specific gravity of FA and CA are 2.65 and 2.75 respectively. A slump of 40mm is necessary. The specific gravity of cement is 3.15. Assuming the necessary data design the mix as per IS code method. 14M

## **UNIT-V**

9. What is polymer concrete? What is its significance? Explain the types of polymer concrete. 14 M
- (OR)**
10. a) Explain self-compacting concrete. 7M  
b) Describe applications of light weight concrete. 7M



**INSTRUMENTATION AND CONTROL SYSTEMS  
(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) List out the different errors involved in the measurement process. Explain how these errors can be eliminated? 8M  
b) What are Transducers and how are they classified? 6M

**(OR)**

2. a) Explain the working of piezo-electric transducer for the measurement of displacement with a sketch. 7M  
b) Sketch and explain variable capacitive transducer elements. 7M

**UNIT-II**

3. a) With the help of suitable diagrams, derive the expressions for quarter bridge and half bridge circuits of Wheatstone bridge used for strain measurement. Give applications of each. 8M  
b) Name the various types of strain gauges for different applications. 6M

**(OR)**

4. a) What do you understand by a strain rosette? How is it used? Explain. 7M  
b) Explain different methods of temperature compensation in strain gauges. 7M

**UNIT-III**

5. a) Discuss the working of a bourdon tube pressure gauge with relevant sketches and mention merits and demerits. 8M  
b) What is a thermistor? How is it used for temperature measurement? 6M

**(OR)**

6. a) State law of thermocouples. How are the laws useful in construction of thermocouple thermometers? 7M  
b) Explain a capacitive liquid level sensor used to measure liquid level with a sketch. 7M

**UNIT-IV**

7. a) Why is a rotameter called a variable area flow meter? Sketch and explain its working. 7M  
b) Sketch and explain the construction and working of a dew point meter. 7M

**(OR)**

8. a) Define the following terms i) Humidity ii) Absolute humidity iii) Relative Humidity iv) Specific humidity 7M  
b) Explain the working of a sling psychrometer with a sketch. 7M

**UNIT-V**

9. a) Distinguish between open-loop and closed loop control systems. 7M  
b) Explain the significance of the control system and mention basic elements of a control system? 7M

**(OR)**

10. a) Differentiate between proportional, proportional integral and proportional integral derivative controllers. 9M  
b) Enumerate and define the elements of a control system. 5M

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

### **UNIT-I**

1. a) Describe java programming structure with example 7 M  
b) Write a Java program to find the sum of all even numbers from 1 to 100 7 M
- (OR)**
2. a) Write a java program to find the smallest of three numbers 7 M  
b) Define variable. Explain types of variable in java 7 M

### **UNIT-II**

3. a) Define Class and explain the Declaration of Class and object with an example? 7 M  
b) How to install the JDK explain step-by-step and also explain how to set the path temporarily and permanently. 7 M
- (OR)**
4. a) What is a nested class? Differentiate between static nested classes and non-static nested classes. 7 M  
b) Compare method overloading with constructor overloading. 7 M

### **UNIT-III**

5. a) What is Inheritance and explain with an example? 7 M  
b) Briefly explain about different types of Inheritance? 7 M
- (OR)**
6. a) What is Interface and explain with an example? 7 M  
b) What is multiple inheritance and how can you implement this? 7 M

### **UNIT-IV**

7. a) What are the different types of packages? Explain. 7 M  
b) Discuss in detail the exception handling fundamentals. 7 M
- (OR)**
8. a) Discuss the functions of the importing packages. 7 M  
b) Explain in detail the user defined exception. 7 M

### **UNIT-V**

9. a) Explain how two threads can communicate with each other and Classify the methods which are used in inter thread communication? 7 M  
b) Explain the producer consumer problem in inter thread communication? 7 M
- (OR)**
10. a) Construct a java program on applets and explain how to execute the applet program? 7 M  
b) Explain Hierarchy of Applet class 7 M

# AR13

CODE: 13EE3015

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, February, 2022

ELECTRICAL MACHINES – III  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 70

## PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is the application of salient pole machine.  
b) What is the nature of armature reaction for lagging pf load  
c) What are the different methods used to determine voltage regulation of alternator  
d) Define infinite busbar  
e) What are the conditions for parallel operation of alternator  
f) Write the characteristics infinite bus  
g) What are the different methods of starting of synchronous motor  
h) What is inverted V curves  
i) Why is a single phase induction motor not self starting  
j) Write at least two applications of AC series motor

## PART-B

Answer one question from each unit

[5x12=60M]

### UNIT-I

2. a) Distinguish between distributed and concentrated windings. Also explain any one type of distributed winding employed in synchronous machines [6M]  
b) An 8-pole alternator has an armature with 30 slots and 8 conductors per slot. The flux per pole is 0.08 Wb and machine rotates at 750 rpm. Calculate EMF generated, if winding factor is 0.94 and all conductors in a phase are connected in series [6M]
- (OR)
3. a) With neat sketch, describe the constructional features and operation of salient pole and round rotor alternator. [6M]  
b) Derive the EMF equation of an alternator. [6M]

### UNIT-II

4. a) Develop an expression for regulation of a salient pole synchronous generator. [6M]  
b) A 550V, 55KVA, 1-phase alternator has an effective resistance of  $0.2\Omega$ . A field current of 10 A produces an armature current of 200 A on short-circuit and an electromotive force of 450V on open circuit. Calculate the full regulation with 0.8 power factor lagging [6M]
- (OR)
5. Describe the method of finding regulation of an alternator using ZPF method. [12M]

# AR13

**CODE: 13EE3015**

**SET-1**

## UNIT-III

6. a) Discuss the condition required for paralleling two synchronous generators. [6M]  
b) A 1500 KVA, 6600 3-phase, 8 pole, 750 rpm, synchronous generator is operating on 6000V bus bars. The synchronous reactance is 6 ohm/phase. find the synchronizing power at full load and 0.8 power factor lagging. [6M]
- (OR)
7. Explain the effect of change of excitation and mechanical input of a synchronous machine. [12M]

## UNIT-IV

8. a) Explain the construction and principle of operation of a synchronous motor? [6M]  
b) A 2000 V, 3-phase star-connected synchronous motor has an effective resistance and synchronous reactance per phase of 0.2 ohms and 2.2 ohms respectively. The input is 800 KW at normal voltage and induced line e.m.f is 2500 V. Calculate line current and power factor [6M]
- (OR)
9. a) Explain the various starting methods of synchronous motor [6M]  
b) A 1000 HP, 6 kV, 3-phase, star connected synchronous motor has a synchronous impedance of  $(1.5+j16)$  ohms per phase. It is excited to develop an open circuit e.m.f of 5 kV. Draw the locus diagram of the current for loads up to 1250 HP with constant excitation. Determine the maximum value of the power factor. [6M]

## UNIT-V

10. a) Explain the double field revolving theory of single phase induction motor. [6M]  
b) Explain the construction and operation of shaded pole motor. [6M]
- (OR)
11. Explain why a universal motor operate both on AC and DC supply. What are the differences in construction between universal motor and DC series motor? Discuss its applications. [12M]

# AR13

**CODE: 13ME3017** **SET-2**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**

**III B.Tech I Semester Supplementary Examinations, February-2022**

## **THERMAL ENGINEERING - II** **(Mechanical Engineering)**

**Time: 3 Hours**

**Max Marks: 70**

### **PART-A**

**ANSWER ALL QUESTIONS**

**[1 x 10 = 10 M]**

1. a) What do you understand by the mean temperature of heat addition?  
b) Differentiate between net and gross calorific values.  
c) Why are superheaters used on boilers?  
d) Write the basic combustion equations.  
e) Define degree of supersaturation  
f) Classify the steam condenser.  
g) Explain the principle of an impulse turbine  
h) Define degree of reaction.  
i) Draw a T-s diagram of open cycle gas turbine with perfect reheating  
j) What is the difference between a propeller engine and jet engine.

### **PART-B**

**Answer one question from each unit**

**[5x12=60M]**

#### **UNIT-I**

2. a) Derive an expression for thermal efficiency of the actual Rankine cycle [6M]  
b) Steam at 20 bar, 360°C is expanded in a steam turbine to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. a) Assuming ideal processes, find per kg of steam the net work and the cycle efficiency b) if the turbine and the pump have each 80% efficiency, find the percentage reduction in the net work and cycle efficiency. [6M]
- (OR)**
3. a) Explain the working of Boy's gas calorimeter with the help of a neat sketch. [6M]  
b) The gravimetric analysis of a sample of coal gives 80% of carbon, 12% of H<sub>2</sub> and 8% of ash. Calculate the theoretical air required and analysis of products by volume. [6M]

#### **UNIT-II**

4. a) Explain working of Bacoock and Wilcox boiler. [6M]  
b) Write short notes on, water level indicator, safety valves, fusible plug, feed check valve, pressure gauge, and blow off cock. [6M]
- (OR)**
5. a) Derive the condition for maximum discharge through a chimney in natural draught. [6M]  
b) A boiler is equipped with a 25 m high chimney. The ambient temperature is 26°C and the temperature of the flue gases in the chimney is 310°C. The quantity of air supplied to the boiler is 19 kg per kg of fuel burnt. Determine [6M]  
(i) The theoretical draught produced in cm of water.  
(ii) The velocity of the flue gases in the chimney if 55% of the theoretical draught is lost in friction at the grate and passage.

### UNIT-III

6. a) What do you understand by supersaturation of steam flowing through nozzles? Explain the phenomenon and factors responsible for it. [6M]  
b) Convergent-divergent nozzle operates with steam entering at 30 bar, 300°C and leaving at 5 bar, 800 m/s. Assuming negligible inlet velocity and the friction to occur in only divergent portion of nozzle with mass flow rate of 10 kg/s, determine, (i) the efficiency for expansion in divergent portion of nozzle, (ii) the velocity of steam at throat. [6M]

(OR)

7. a) Write short notes on Elements (Requirements) of condensing plant [6M]  
b) In a condenser test following observations are made. [6M]  
Vacuum=700 mm of Hg, Barometer Reading=760 mm of Hg,  
Mean temp of condensation=35°C, Hot well temp=28°C  
Mass of cooling water=50,000 kg/hr  
Inlet temp=17°C, Outlet temp=30°C,  
Mass of condensate per hour=1250kg  
Find  
i) Mass of air present per m<sup>3</sup> of condenser volume.  
ii) The state of steam entering the condenser. iii) Vacuum efficiency

### UNIT-IV

8. a) What do you understand by compounding of steam turbines? Describe pressure compounding of steam turbines. [6M]  
b) A single stage steam turbine is supplied with steam at 5 bar and 200°C at the rate of 50 kg/min. It expands into a condenser at a pressure of 0.2 bar. The blade speed is 400 m/s. The nozzles are inclined at an angle of 20° to the plane of the wheel and the outlet blade angle is 30°. Neglecting friction losses. Determine the power developed, blade efficiency and stage efficiency. [6M]

(OR)

9. a) Sketch the velocity diagram for a single stage reaction turbine having 50% degree of reaction and explain it briefly. [6M]  
b) A certain stage of a parson's reaction turbine consists of one row of fixed blades and one row of moving blades. The mean dia of the blades = 68 cm, speed of the turbine = 3000 RPM, The mass of steam passing/sec = 13.5 kg, Steam velocity at exit from fixed blades = 143.7 m/s, The blade outlet angle = 20° Calculate the power developed in the stage and gross efficiency, assuming carry over coefficient as 0.74 and the efficiency of conversion of heat energy into kinetic energy in the blade channel as 0.92. [6M]

### UNIT-V

10. a) A Joule Cycle uses a pressure ratio of 8. Calculate the air standard efficiency. The isentropic efficiency of the turbine and compressor are both 90%. The low pressure in the cycle is 120 kPa. The coldest and hottest temperatures in the cycle are 20°C and 1200°C respectively. Calculate the cycle efficiency with friction and deduce the change. Calculate the nett power output. Take  $\gamma = 1.4$  and  $c_p = 1.005$  kJ/kg K. Take the mass flow as 3 kg/s. [6M]  
b) Compare the influence of reheating, regeneration and intercooling on performance of gas turbine cycle. [6M]

(OR)

11. a) Explain the working of a turbojet engine with the help of a sketch. [6M]  
b) A turbojet is flying with a speed of 850 kmph at an altitude, where air density is 0.17 kg/m<sup>3</sup>. The propulsive and overall efficiencies are 55% and 17% respectively. If the drag on aircraft is 6100 N, calculate the exit velocity of jet, diameter of jet and propulsive power. [6M]

# AR13

**CODE: 13CS3014** **SET-2**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**  
**III B.Tech I Semester Supplementary Examinations, February-2022**

## **OPERATING SYSTEMS** **(Common to CSE & IT)**

**Time: 3 Hours**

**Max Marks: 70**

### **PART-A**

**ANSWER ALL QUESTIONS**

**[1 x 10 = 10 M]**

1. a) List the six major categories of System calls.  
b) What are the different types of user interfaces  
c) What is Counting Semaphore?  
d) What is the purpose of Resource-Allocation Graph?  
e) List the three methods for handling deadlocks.  
f) What is copy-on-write in virtual memory concept?  
g) How an operating system works as a resource manager?  
h) List some character devices.  
i) What is CPU-I/O Burst Cycle?  
j) Differentiate Process and Thread.

### **PART-B**

**Answer one question from each unit**

**[5x12=60M]**

#### **UNIT-I**

2. a) Discuss about Process Control Block and threads. 6M  
b) Explain the mechanisms involved in creating processes and illustrate process creation on UNIX and Windows systems. 6M

**(OR)**

3. a) Discuss the functionality of Multi-Processor scheduling. 5M  
b) Consider the following set of Processes, with the length of CPU burst in milliseconds. Process PI P2 P3 P4 P5 7M  
Arrival time 00 02 03 06 30  
Burst time 10 12 14 16 05

Draw a Gantt chart that illustrates the execution of these processes using the preemptive shortest job first (SJF) algorithm. Hence find the average waiting time.

#### **UNIT-II**

4. a) Define cooperating Process? List the three conditions required for solution to critical section problem. With the help of an example, explain Peterson's solution. 6M  
b) Summarize the Bounded-Buffer Problem and the Readers-Writers Problem. 6M
- (OR)**
5. a) With an example, demonstrate the functioning of Bankers algorithm to determine a given system state is safe or not. Also discuss about the Resource request Algorithm. 6M  
b) Discuss different deadlock prevention methods with examples. 6M

### **UNIT-III**

6. a) Illustrate contiguous memory allocation concept. 6M  
b) Explore the most common techniques for structuring the page table 6M
- (OR)**
7. a) Explain in detail about segmentation. 6M  
b) Illustrate and compare Optimal page-replacement algorithm and Least-Recently-Used page-replacement algorithm with an example. 6M

### **UNIT-IV**

8. a) Explain various file access methods. 6M  
b) Explain in detail File Sharing and Protection. 6M
- (OR)**
9. a) Discuss various File Allocation Methods. 6M  
b) Explain the structure of File System. 6M

### **UNIT-V**

10. Explain LOOK and SCAN algorithm. Suppose the following disk request sequence (track numbers) for a disk with 200 tracks is given: 23, 89, 132, 42, 187. Assume that the initial position of the R/W head is on track 100. How many tracks of additional distance will be traversed by the R/W head when the LOOK algorithm is used compared to the SCAN (Elevator) algorithm (assuming that R/W head moves towards 200 when it starts execution). 12M

**(OR)**

11. Classify different Device drivers and Explain. 12M