

# AR18

**CODE: 18CET207**

**SET-2**

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

**II B.Tech II Semester Regular and Supplementary Examinations, September, 2021**

## **Fluid Mechanics-II (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) Derive the various conditions for the most economical trapezoidal channel section. 6 M  
b) A rectangular channel 4 m wide has depth of water 1.5 m. The slope of the bed of the channel is 1 in 1000 and  $C = 55$ . It is desired to increase the discharge to a maximum by changing the dimensions of the section for constant area of cross-section, slope of the bed and roughness of the channel. Determine the dimensions of the channel and increase in discharge. 6 M
- (OR)
2. a) Explain various types of channel bottom slopes. 6 M  
b) Determine the slope of the free water surface in a rectangular channel of width 20 m, having depth of flow 5 m. The discharge through the channel is  $50 \text{ m}^3/\text{s}$ . The bed of the channel is having a slope of 1 in 4000. Take the value of chezy's constant,  $C = 60$ . 6 M

### **UNIT-II**

3. a) State the Angular Momentum Principle. Derive an equation for the work done by the jet of water on a series of radial curved vanes. 6 M  
b) A jet of water 7.5 cm diameter having a velocity of 20 m/sec, strikes normally a flat smooth plate. Determine the force on the plate (a) if the plate is at rest, (b) if the plate is moving in the same direction as the jet with a velocity of 5 m/sec. Also, find the work done per second on the plate in each case and the efficiency of the jet when the plate is moving. 6 M
- (OR)
4. a) Derive an expression for the force exerted by jet of water on a symmetrical moving curved vane when the jet strikes at the centre. 6 M  
b) A jet of water having a velocity of 25 m/sec strikes a curved vane, which is moving with a velocity of 10 m/sec. The jet makes an angle of  $20^\circ$  with the direction of motion of vane at inlet and leaves at an angle of  $130^\circ$  to the direction of motion of vane at outlet, determine, i) vane angles at the inlet and outlet, ii) work done/sec per unit weight of water and iii) efficiency of the jet. 6 M

### UNIT-III

5. a) Define specific speed of a turbine and derive an expression for the same. 6 M  
b) Design a Pelton turbine to develop 10 MW of power working against a head of 425 m. The overall efficiency of the turbine is equal to 80%. 6 M

(OR)

6. a) Define 'Cavitation', effects and precautions against Cavitation. 6 M  
b) A Kaplan turbine produces 60,000 kW under a net head of 25m with an overall efficiency of 90%. Taking the value of speed ratio as 1.6 and flow ratio as 0.5 and hub diameter equal to 0.35 times the outer diameter, determine the diameter and speed of the turbine. 6 M

### UNIT-IV

7. a) Define pump? What are the different types of pumps? Explain briefly. 6 M  
b) What are the different types of heads in pumps explain with neat sketch. 6 M

(OR)

8. a) Explain 'Pumps in Series' and 'Pumps in parallel'. 6 M  
b) The internal and external diameter of an impeller of a centrifugal pump, which is running at 1200 r.p.m. are 25 cm and 50 cm respectively. The discharge through pump is  $0.055 \text{ m}^3/\text{sec}$  and the velocity of flow is constant and equal to 2.5 m/sec. The diameters of the suction and delivery pipes are 17 cm and 12 cm and suction and delivery heads are 6 m and 28 m of water. If the outlet vane angle is  $48^\circ$  and the power required to drive the pump is 18.2 kW. Determine, (i) Vane angle of the impeller at inlet, (ii) The overall efficiency of the pump, and (iii) Manometric efficiency of the pump. 6 M

### UNIT-V

9. a) List out different dimensionless numbers and derive the expressions for any three of them. 6 M  
b) Derive on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust  $P$  depends upon the angular velocity  $\omega$ , speed of advance  $V$ , diameter  $D$ , dynamic viscosity  $\mu$  and density  $\rho$ , elasticity of the fluid medium which can be denoted by the speed of sound in the medium  $C$ . 6 M

(OR)

10. a) Define 'Similitude'. Explain various types of similarities. 6 M  
b) The pressure difference  $\Delta p$  in a pipe of diameter  $D$  and length  $l$  due to viscous flow depends on the velocity  $V$ , viscosity  $\mu$  and density  $\rho$ . Using Buckingham's  $\pi$ -theorem, obtain an expression for  $\Delta p$ . 6 M

# AR18

**CODE: 18EET207**

**SET-2**

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

**II B.Tech II Semester Regular and Supplementary Examinations September,2021**

**ELECTRICAL MACHINES-II  
(Electrical and 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 Torque-slip and Torque-speed characteristics of 3-phase Induction motor 6 M
- b) A 746kW, 3-phase, 50 Hz, 16-pole induction motor has a rotor impedance of  $(0.02+j0.15)\Omega$  at standstill. Full load torque is obtained at 360 rpm. Calculate (i) Ratio of maximum to full load torque (ii) speed for maximum torque and (iii) Rotor resistance to be added to get maximum starting torque. 6M

**(OR)**

2. a) Draw and explain in detail the equivalent circuit of 3-phase Induction motor with the help of phasor diagram. 6 M
- b) Explain the construction details of 3-phase Induction motor. 6M

## UNIT-II

3. Explain in details the various speed control methods for 3-phase induction motor 12 M
- (OR)**
4. Explain the procedure to construct the circle diagram from no-load and blocked rotor test on 3-phase induction motor and how will you calculate different parameters from it. 12 M

### UNIT-III

5. a) Explain the principle of operation of Alternator. What are the advantages of stationary armature over rotating armature? 6 M
- b) Explain the process of armature reaction when alternator is delivering a load, (i) Load p.f is unity (ii) Load p.f is zero lagging and (iii) Load p.f is zero leading. 6 M

(OR)

6. A 3-phase, 8-pole, 750 rpm star connected alternator has 72 slots on armature. Each slot has 12 conductors and winding is short chored by 2 slots. Find the EMF induced between lines, flux per pole is 0.06 Wb. Derive the expression used for EMF induced in alternator. 12 M

### UNIT-IV

7. a) What are the advantages of parallel operation of Alternators? What are the conditions that must be satisfied for paralleling Alternators with infinite busbars? 6 M
- b) What are the reasons for hunting to occur in Alternators? How can it be reduced? 6 M

(OR)

8. a) Explain how voltage regulation of alternator is obtained using Potier's Method 6 M
- b) Explain the procedure to find the voltage regulation of an alternator by Synchronous impedance Method. 6 M

### UNIT-V

9. a) Mention similarities and dissimilarities between Induction motors and Synchronous motors 6 M
- b) Explain the various starting methods of synchronous motor 6 M

(OR)

10. Explain construction details and principle of operation of synchronous motors. Why synchronous motors are not self-starting? How can a synchronous motor be made self-starting? 12 M

# AR18

**CODE: 18MET205**

**SET-1**

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

**II B.Tech II Semester Regular and Supplementary Examinations, September, 2021**

**IC ENGINES**

**(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

## **UNIT-I**

1. a) Differentiate between Spark ignition and Compression ignition engine 6 M
- b) Classify IC engines based on Various considerations. 6 M

**(OR)**

2. a) Explain Scavenging of two stroke engines 6 M
- b) Make a comparison between air standard and actual cycles 6 M

## **UNIT-II**

3. a) Explain the stages of combustion in SI engines 6 M
- b) Explain the phenomenon of pre-ignition in SI engine. Discuss how pre-ignition leads to detonation and vice-versa 6 M

**(OR)**

4. a) Explain any three different combustion chambers for CI engines 6 M
- b) Explain the working of a simple carburettor 6 M

## **UNIT-III**

5. a) Discuss the variables that affect the performance and efficiency of an I.C. Engine. 6 M
- b) Explain heat balance sheet 6 M

**(OR)**

6. A trail was conducted on a single-cylinder oil engine having a cylinder diameter of 20 cm and stroke 35 cm. The engine is working on the four-stroke cycle and the following observations were made: Duration of trail = 44 minutes, Total fuel used = 7 litres, Calorific value = 42 MJ/kg, Total number of revolutions = 12624, Gross imep = 7.25 bar, Pumping imep = 0.45 bar, Net load on the brake = 250 kg, Diameter of the brake wheel drum = 1.78m, Diameter of the rope = 3 cm, Cooling water circulated = 550 litres, Cooling water temperature rise = 48°C, Specific heat of water = 4.18 kJ/kg K. Specific gravity of oil = 0.8. Calculate the mechanical efficiency and also the unaccounted losses. 12M

#### **UNIT-IV**

7. a) Explain any two methods for controlling emissions from an automobile. 6 M
- b) What are the harmful effects that cause due to pollutions from an automobile. 6 M
- (OR)**
8. a) Write a short note on alternate fuels for IC engines. 6 M
- b) Write a short notes on use of alcohol fuels. 6 M

#### **UNIT-V**

9. a) Explain the working of Centrifugal compressor with the help of a neat sketch. 6 M
- b) Describe with a neat sketch the construction and working of a single-stage single acting Reciprocating compressor. 6 M
- (OR)**
10. a) Write classification of rotary compressors and explain working principle of roots blower With a neat sketch? 6 M
- b) What is a centrifugal compressor? How does it differ from an axial flow compressor? 6 M

# AR18

**CODE: 18ECT209**

**SET-1**

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

**II B.Tech II Semester Regular and Supplementary Examinations, September, 2021**

**DIGITAL ELECTRONICS  
(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) Represent the following decimal numbers in 2's complement 6M representation using 8-bits (i) -44 (ii) 64.  
b) Find out the BCD, Excess-3, Gray code for the decimal numbers from 6M 0 to 9.

**(OR)**

2. a) Find the gray code for the following binary numbers (i) 11001100 (ii) 6M 01011110  
b) What is Excess-3 code? Explain the rules of addition of two Excess-3 6M code numbers with example.

## UNIT-II

3. a) Draw the logic symbols, construct the truth tables, and with the help 6M of circuit diagrams explain the working of following gates (i) NAND (ii) NOR (iii) EX-OR  
b) Simplify the following three variable expression using Boolean algebra 6M  $Y(A, B, C) = \sum m(0, 1, 2, 3, 4, 5, 6, 7)$

**(OR)**

4. a) Minimize the following logic function using K-map and implement it 6M using logic gates.  
 $Y(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 14)$   
b) Simplify the given expression using tabular procedure 6M  
 $F(V, W, X, Y, Z) = \sum m(0, 4, 12, 16, 19, 24, 27, 28, 29, 31)$

### **UNIT-III**

5. a) Design a Half adder and full subtractor circuit using NAND gates. 6M
- b) Explain the logic diagram of carry look ahead adder with an example. 6M

**(OR)**

6. a) Draw and explain the 4-bit binary adder with an example. 6M
- b) Explain the logic diagram of Excess-3 adder with an example. 6M

### **UNIT-IV**

7. a) With the help of logic diagram and truth table, explain an octal to binary encoder. 6M
- b) With the help of logic diagram and truth table, explain 1-line to 8-line demultiplexer. 6M

**(OR)**

8. a) With the help of logic diagram and truth table, explain 2-line to 4-line decoder with NAND gates. 6M
- b) Design 16 x1MUX using two 8 x1MUX and one 2 x 1MUX. 6M

### **UNIT-V**

9. a) Draw the circuit diagram of a clocked SR flip flop and explain its operation with the help of a truth table. 6M
- b) Draw and explain the logic diagram of 4-bit bidirectional shift register. 6M

**(OR)**

10. a) Write the excitation tables for all flip-flops. 6M
- b) Draw the circuit diagram of 4 bit johnson counter using D-flip flop and explain its operation. 6M



# AR18

**CODE: 18CST206**

**SET-2**

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

**II B.Tech II Semester Regular & Supl. Examinations, September, 2021**

**Operating Systems  
(Common to CSE AND 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) What are the various objectives and functions of Operating systems? **6M**  
b) What is system calls in OS? Explain in detail with its types. **6M**  
(OR)
2. a) What is a process? Explain different process states **6M**  
b) Explain about process scheduling? Explain different types of schedulers? **6M**

## UNIT-II

3. a) What is process synchronization **6M**  
b) Discuss semaphores. **6M**  
(OR)
4. a) Explain about Deadlock Avoidance **6M**  
b) Explain about recovery from deadlock ? **6M**

## UNIT-III

5. a) Discuss optimal page replacement algorithms **6M**  
b) Explain Allocation of frames **6M**  
(OR)
6. a) Explain contiguous memory allocation techniques **6M**  
b) Discuss about paging in OS. **6M**

## UNIT-IV

7. Explain the following wrt file **12M**  
(a) Concept of file  
(b) Access methods  
(c) File sharing  
(OR)
8. a) Explain free space management in detail. **6M**  
b) Explain file system structure **6M**

## UNIT-V

9. Explain I/O management in detail **12M**  
(OR)
10. Discuss about disk scheduling in detail **12M**

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) Discuss in detail about the Rayleigh's method of dimensional analysis. 6M
- b) The pressure difference  $\Delta p$  in a pipe of diameter  $D$  and length  $L$  due to viscous flow depends on the velocity  $V$ , viscosity  $\mu$  and density  $\rho$ , using Buckingham's theorem, obtain an expression for  $\Delta p$ . 8M

**(OR)**

2. a) Explain the Buckingham's method of dimensional analysis. 6M
- b) The resisting force  $R$  of a supersonic plane during flight can be considered as dependent upon the length of the aircraft  $l$ , velocity  $V$ , air viscosity  $\mu$ , air density  $\rho$ , and bulk modulus of air  $K$ . Express the functional relationship between these variables and the resisting force. 8M

**UNIT-II**

3. a) Derive the maximum discharge condition for most economical circular section channel. 6M
- b) A trapezoidal channel has side slopes of 3 horizontal to 4 vertical and slope of its bed is 1 in 2000. Determine the optimum dimensions of the channel, if it is to carry water at  $0.5 \text{ m}^3/\text{s}$ . Take Chezy's constant as 80. 8M

**(OR)**

4. a) What is hydraulic jump? Derive the expression for energy loss due to hydraulic jump. 6M
- b) Find the slope of free water surface in a rectangular channel of width 20 m, having depth of flow 5 m. The discharge through the channel is  $50 \text{ m}^3/\text{s}$ . The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant  $C = 60$ . 8M

**UNIT-III**

5. a) A jet of water of diameter 50mm moving with a velocity of 40 m/s, strikes a curved fixed symmetrical plate at the centre. Find the force exerted by the jet of water in the direction of the jet, if the jet is deflected by through an angle of  $120^\circ$  at the outlet of the curved plate. 6M
- b) A nozzle of 50mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5 m/s. Find: (i) the force on the plate, (ii) the work done and (iii) the efficiency of jet. 8M

**(OR)**

6. a) Find the force exerted by a jet of water of diameter 100 mm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 50 m/s. 6M
- b) A water jet 20 mm in diameter and having a velocity of 90 m/s strikes series of moving blades in a wheel. The direction of the jet makes  $20^\circ$  with the direction of movement of the blade. The blade angle at inlet is  $35^\circ$ . If the jet should enter the blade without striking, what should be the blade velocity? If the outlet angle of the blade is  $30^\circ$ , determine the force on the blade. Assume that there is no friction involved in the flow over the blade. 8M

#### UNIT-IV

7. a) Define the specific speed of the turbine and its significance. Derive an expression for the specific speed. 6M
- b) Two jets strike at bucket of a Pelton wheel, which is having shaft power as 14,715 kW. The diameter of each jet is given as 150 mm. If the net head on the turbine is 500 m, find the overall efficiency of the turbine. Take  $C_v = 1.0$  8M

(OR)

8. a) Discuss the following terms in detail with their equations as they are applied to hydro-electric power plant based on impulse/reaction turbine: (i) gross head, (ii) net head, (iii) overall efficiency, (iv) volumetric efficiency, (v) hydraulic efficiency and (vi) mechanical efficiency. 6M
- b) A Kaplan turbine working under a head of 29 m develops 1287.5 kW shaft power. If the speed ratio is equal to 2.1, flow ratio is 0.62, diameter of boss is equal to 0.34 times the diameter of the runner and overall efficiency of the turbine is 89%, find the diameter of the runner and the speed of the turbine. 8M

#### UNIT-V

9. a) Define a centrifugal pump. Explain the working of a single stage centrifugal pump with neat sketches. 6M
- b) The diameter and width of a centrifugal pump impeller are 50 cm and 2.5 cm. The pump runs at 1200 rpm. The suction head is 6 m and the delivery head is 40m. The frictional drop in suction is 2 m and in the delivery 8 m. The blade angle at out let is  $30^\circ$ . The manometric efficiency is 80% and the overall efficiency is 75%. Determine the power required to drive the pump. Also calculate the pressures at the suction and delivery side of the pump 8M

(OR)

10. a) Draw characteristic curves for centrifugal pump. 6M
- b) Find the power required to drive a centrifugal pump which delivers 50 litres of water per second to a height of 30m through a 15cm diameter pipe and 100m long. The overall efficiency of the pump is 70% and co-efficient of friction  $f = 0.015$  in the formula  $h_f = \frac{4fLV^2}{(dx2g)}$  8M

# AR16

**CODE: 16EE2012**

**SET-2**

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

**II B. Tech II Semester Supplementary Examinations, Supplementary, 2021**

**ELECTRICAL MACHINES-II  
(ELECTRICAL & ELECTRONICS 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) Derive the torque equation of three phase induction motor. 6M
  - b) An 8 pole, 3 phase induction motor running with the slip of 4 % takes 20 kW from 50 Hz supply. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.2 Nm. Find the power output and efficiency. 8M
- (OR)**
2. a) Explain the working principle of three phase induction motor. 8M
  - b) Compare squirrel cage and slip ring induction motors. 6M

## UNIT-II

3. Draw the circle diagram of a 20 HP, 400 V, 50 Hz, 3  $\Phi$  star connected induction motor from the following test data (Line Values). 14M  
**No load test:** 400 V, 9 A, P.F = 0.2  
**Blocked rotor test:** 200 V, 50 A, P.F = 0.4  
From the circle diagram find, a) Line current, P.F and efficiency at full load b) Full load slip. The stator and rotor copper losses are divided equally in the blocked rotor test.
- (OR)**
4. a) What is the need for starters in induction motor starting? Explain any one starter in detail. 8M
  - b) Write a short note on induction generator with appropriate sketches. 6M

### UNIT-III

5. a) Differentiate between the salient and non salient pole synchronous alternator. 7M  
b) Derive the EMF equation of the alternator. 7M
- (OR)**
6. a) What is armature reaction in alternators? Explain it for various P.F conditions. 9M  
b) Calculate the distribution factor for a 72 slots, 4 pole, 5M single layer three phase armature winding.

### UNIT-IV

7. a) Explain in detail about Blondel's two reaction theory. 7M  
b) Explain the procedure to find the voltage regulation of an alternator by Synchronous impedance Method 7M
- (OR)**
8. A 10 kVA, 440 V, 50 Hz, 3  $\Phi$  star connected alternator 14M has the open circuit characteristics as given.

<b>Field current</b>	1.5	3	5	8	11	15
<b>Line voltage</b>	150	300	440	550	600	635

With full load Zero P.F., the applied excitation required is 14 A to produce 500 V of terminal voltage. On short circuit, 4 A excitation is required to give full load current. Determine the voltage regulation for full load, 0.8 P.F lagging.

### UNIT-V

9. a) Explain the working principle of a three-phase synchronous motor. 7M  
b) Explain the various starting methods of synchronous motor. 7M
- (OR)**
10. a) Explain with neat sketch, how a synchronous motor can be operated as synchronous condenser. 9M  
b) How to prevent hunting in synchronous motor? 5M

# AR16

**CODE: 16ME2010**

**SET-2**

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

**II B.Tech II Semester Supplementary Examinations, September, 2021**

**THERMAL ENGINEERING - I  
(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) Explain the working principle of 4 stroke SI Engine with a suitable sketch. 10 M  
b) Distinguish among air standard cycle, and actual cycle. 4 M
- (OR)**
2. a) Explain about loss due to rubbing friction and loss due to gas exchange process. 6 M  
b) Distinguish between four stroke engine and two stroke engine 8 M

## **UNIT-II**

3. a) What are the basic parameters that influence the flame speed? Discuss the influence of engine variables on the flame speed? 8 M  
b) Briefly explain the detonation in SI Engine? 6 M
- (OR)**
4. a) Discuss the desirable characteristics of a good combustion chamber for an SI engine. 10 M  
b) What is octane number? Explain briefly. 4 M

## **UNIT-III**

5. a) What is Cetane number? Explain how CI engine fuels are rated with an example. 6 M  
b) What is Physical delay? Discuss the factors that affect the delay period in a C.I. engine. 8 M
- (OR)**
6. Classify CI engine combustion chambers, explain Direct Injection combustion chambers briefly and list out advantages and disadvantages. 14 M

## UNIT-IV

7. a) A gasoline engine working on four stroke develops a brake power of 20.9 kW. A Morse Test was conducted on this engine and the brake power (kW) obtained when each cylinder was made inoperative by short circuiting the spark plug are 14.9, 14.3, 14.8 and 14.5 respectively. The test was conducted at constant speed. Find the indicated power, mechanical efficiency and bmep when all the cylinders are firing. The bore of the engine is 75 mm and the stroke is 90 mm. The engine is running at 3000 rpm. 8 M
- b) Enumerate the various engine efficiencies. Explain? 6 M
- (OR)**
8. a) The following observations were made during a trial of a single-cylinder, four-stroke cycle gas engine having cylinder diameter of 18 cm and stroke 24 cm. 14 M
- Duration of trial = 30 min  
Total number of revolution = 9000  
Total number of explosion = 4450  
Mean effective pressure = 5 bar  
Net load on the brake wheel = 40 kg  
Effective diameter of brake wheel = 1 m  
Total gas used at NTP = 2.4 m<sup>3</sup>  
Calorific value of gas at NTP = 19 MJ/m<sup>3</sup>  
Total air used = 36 m<sup>3</sup>  
Pressure of air = 720 mm Hg  
Temperature of air = 17 °C  
Density of air at NTP = 1.29 kg/m<sup>3</sup>  
Temperature of exhaust gas = 350 °C  
Room temperature = 17 °C  
Specific heat of exhaust gas = 1 kJ/kg K  
Cooling water circulated = 80 kg  
Rise in temperature of cooling water = 30 °C  
Draw up a heat balance sheet and estimate the mechanical and indicated thermal efficiencies of the engine. Take  $R = 287 \text{ J/kg K}$ .

## UNIT-V

9. a) Differentiate between rotary and reciprocating compressors. 7 M
- b) With a neat sketch explain the working of Vane sealed compressor. 7 M
- (OR)**
10. a) Draw the schematic diagram of axial flow air compressor and explain its working along with velocity triangles. 9 M
- b) A single stage reciprocating compressor is required to compress 80 m<sup>3</sup> of air from 1 bar abs to 10 bar abs. find the work done to be supplied, if the law of expansion is  $PV^{1.25} = \text{Const.}$  5 M

# AR16

**CODE: 16EC2010**

**SET-2**

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

**II B.Tech II Semester Supplementary Examinations, September-2021**

**DIGITAL ELECTRONICS**

**(Electronics and Communication 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) Express the following numbers in decimal: 8  
(i)  $(10110.0101)_2$  (ii)  $(26.24)_8$  (iii)  $(FAFA)_{16}$  (iv)  $(1010.1010)_2$   
b) (i) Perform the following subtraction in 1's complement method  $(11011, 11)_2 - (10110.01)_2$  6  
(ii) Find the 10's complement and 9's complement of 2318  
(OR)
2. a) (a) Prove that in a self-complementing code the sum of the weights must be 9. 8  
(b) Obtain the weights of three different four-bit self-complementing codes whose only negative weight is -4.  
b) (a) Given that  $(16)_{10} = (100)_b$ , determine the value of  $b$ . 6  
(b) Given that  $(292)_{10} = (1204)_b$ , determine the value of  $b$ .

## **UNIT-II**

3. a) 6) Convert the following to the other canonical form: 8  
(a)  $F(x, y, z) = \sum(1, 3, 7)$  (b)  $F(A, B, C, D) = \prod(0, 1, 2, 3, 4, 6, 12)$   
b) (a) Minimise the function  $f(ABCD) = \sum(0, 1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 15)$ , using K-map method. 6  
(OR)
4. a) Implement the Boolean function  $F = xy + x'y' + y'z$  8  
a) with AND, OR, and inverter gates, b) with OR and inverter gates, (c) with AND and inverter gates, d) with NAND and inverter gates and e) with NOR and inverter gates.  
b) Design a Combinational Circuit with 4 inputs A, B, C and D that will produce output '1' whenever two adjacent input variables are 1's. 6

## **UNIT-III**

5. a) Explain the operation of full adder using neat diagram. 7  
b) Implement 4 bit excess 3 adder using binary half adders. 7  
(OR)
6. a) Implement 4 bit adder and subtractor unit using mux based full adders 8  
b) Design 4 bit binary adder using NAND gates only. 6



#### **UNIT-IV**

7. a) Explain the operation of a 4bit magnitude comparator 8  
b) Design 3 X 8 decoder using NOR based implementation. 6  
(OR)
8. a) Implement a seven segment display to display odd numbers only. 8  
b) Design a 8 bit ASCII to binary converter. 6

#### **UNIT-V**

9. a) Design a 4 bit universal shift register 8  
b) Design a 4 bit counter to count odd numbers only. 6  
(OR)
10. a) Implement all the flip-flops using JK flip-flop. Present all the required characteristic tables. 8  
b) Design a four bit ring counter using D flip-flop. 6

**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 about Operating System Services in detail. 10
- b) What are the important functions of Operating system? 4

**(OR)**

2. Suppose that the following processes arrive for execution at the times indicated. Each process will run for the amount of time listed. In answering the questions, use non presumptive scheduling, and base all decisions on the information you have at the time the decision must be made. 14

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

- a) Compare the scheduling criteria for the following scheduling algorithm

(i)FCFS scheduling algorithm

(ii)SJF scheduling algorithm

- b) The SJF algorithm is supposed to improve performance, but notice that we chose to run process P1 at time 0 because we did not know that two shorter processes would arrive soon. Compute what the average turnaround time will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remember that processes P1 and P2 are waiting during this idle time, so their waiting time may increase. This algorithm could be called future-knowledge scheduling.

**UNIT-II**

3. a) Explain the critical section problem and the solution in operating system. 10
- b) How apply Resource allocation graph to check deadlock? 4

**(OR)**

4. Explain in Detail About Banker's Algorithm in operating system.. 14

**UNIT-III**

5. a) Explain in detail about segmentation in operating system with suitable diagram. 10
- b) Write Short Notes on Thrashing. 4

**(OR)**

6. Explain in detail about Demand Paging With neat Sketch 14

**UNIT-IV**

7. a) Write Short notes on File Access Methods. 4
- b) Explain in detail about file system implementation. 10

**(OR)**

8. Explain in Detail about three file allocation methods with neat diagrams. 14

**UNIT-V**

9. a) Explain in detail about magnetic disk with neat sketch. 10
- b) Write Short notes on Magnetic tapes. 4

**(OR)**

10. Explain in detail about the disk scheduling algorithms. 14