

**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. An undisturbed sample of medium sand weighs 484.68 g. The core of the undisturbed sample is 6 cm in diameter and 10.61 cm high. The sample is oven dried for 24 hr at 110°C to remove the water content. At the end of the 24 hr, the core sample weighs 447.32 g. Determine the bulk density, void ratio, water content, porosity, and saturation percentage of the sample. 12M

**(OR)**

2. a) Derive the three dimensional ground water flow equation. 6M  
b) Explain the application of contours in ground water. 6M

**UNIT-II**

3. a) Explain the equation developed by Theis method of solution? 6M  
b) A well penetrating a confined aquifer is pumped at a uniform rate of 2,500 m<sup>3</sup>/day. Drawdowns during the pumping period are measured in an observation well 60 m away; observations of  $t$  and  $s$  are listed in Table. Using the Theis method determine  $T$  and  $S$  for this confined aquifer 6M

$(r = 60 \text{ m})$					
$t, \text{ min}$	$s, \text{ m}$	$r^2/t, \text{ m}^2/\text{min}$	$t, \text{ min}$	$s, \text{ m}$	$r^2/t, \text{ m}^2/\text{min}$
0	0	$\infty$	18	0.67	200
1	0.20	3,600	24	0.72	150
1.5	0.27	2,400	30	0.76	120
2	0.30	1,800	40	0.81	90
2.5	0.34	1,440	50	0.85	72
3	0.37	1,200	60	0.90	60
4	0.41	900	80	0.93	45
5	0.45	720	100	0.96	36
6	0.48	600	120	1.00	30
8	0.53	450	150	1.04	24
10	0.57	360	180	1.07	20
12	0.60	300	210	1.10	17
14	0.63	257	240	1.12	15

**(OR)**

4. Briefly explain about unsteady radial flow in a leaky aquifer? 12M

**UNIT-III**

5. Explain about electric resistivity method for subsurface exploration? 12M

**(OR)**

6. Explain about test drilling for subsurface exploration? 12M

**UNIT-IV**

7. Discuss in detail about artificial recharge of ground water by recharge well method? 12M

**(OR)**

8. Define remote sensing and explain the applications with respect to ground water. 12M

**UNIT-V**

9. Discuss in detail about structure of the fresh salt water interface? 12M

**(OR)**

10. Write down the effects of wells on sea water intrusion? 12M

**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) Define Darcy law. Derive the expression for the Darcy law. 7M  
b) Briefly explain Aquifer, Aquiclude, Aquitard and Aquifuge. 7M

**(OR)**

2. a) Discuss the terms specific yield, specific retention, porosity and their relationship 7M  
b) Explain with a neat sketch how the rock properties were affecting the groundwater. 7M

**UNIT-II**

3. a) Derive the expression for discharge “Q” through a well, fully penetrating a confined aquifer or artesian aquifer. 7M  
b) An unconfined aquifer has a thickness of 40 m. A fully penetrating 20 cm diameter well in this aquifer, is used to pumped water at a rate of 35 lit/sec. the drawdown measured in two observation wells located at distances of 20 m & 120 m from the well are 7.0 m and 1.0 m respectively. Determine the average hydraulic conductivity of the aquifer. 7M

**(OR)**

4. a) Describe a procedure by using-by-using Jacob’s method to calculate the aquifer parameters of a confined aquifer by using the well pumping test data 7M  
b) An unconfined aquifer has a thickness of 40 m. A fully penetrating 30cm diameter well in this aquifer is pumped at a rate of 30 lit/sec. the drawdown measured in two observation wells located at distances of 10 m & 100 m from the well are 7.5m and 0.5m respectively. Determine the average hydraulic conductivity if the aquifer. Assume if any data required. 7M

**UNIT-III**

5. a) Explain with the help of neat sketches of Electrical Resistivity method on the ground surface. 7M  
b) List and explain the different Geophysical Methods for ground water investigation. 7M

**(OR)**

6. a) Illustrate the applications of aerial photogrammetry 7M  
b) List and discuss the different subsurface methods of groundwater exploration. 7M

**UNIT-IV**

7. a) List and explain the indirect techniques used of the ground water recharge. 7M  
b) Explain the relative merits of artificial recharge of groundwater. 7M

**(OR)**

8. a) Describe any one combined techniques of subsurface and surface used for recharge of ground water. 7M  
b) List the applications of remote sensing and GIS and explain any one case study with respect to artificial recharge of groundwater. 7M

**UNIT-V**

9. a) Briefly discuss saline water intrusion. 7M  
b) List the different reason for the saline water intrusion. 7M

**(OR)**

10. a) Drive and explain the Ghyben-Herzberg relation. 7M  
b) Explain the concept of conjunction use of groundwater. 7M

# AR16

**CODE: 16EE4031**

**SET-2**

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

**IV B.Tech II Semester Regular & Supplementary Examinations, June - 2022**

**NON CONVENTIONAL SOURCES OF ENERGY**

**(Electrical and 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) Describe the main features of various types of renewable energy resources 7 M
- b) Discuss about solar energy applications 7 M

**(OR)**

2. a) Explain the working principle of solar room heaters for both day time and night time 8 M
- b) Give the block diagram and explain briefly about photovoltaic power generation 6 M

## **UNIT-II**

3. a) Discuss about power coefficients of windmills 7 M
- b) Discuss the salient features of Horizontal axis wind turbines and Vertical axis wind turbines. 7 M

**(OR)**

4. a) Derive the expression for power extracted from wind considering Betz model of a Wind turbine. What is the maximum theoretical power that can be extracted and under what condition 8 M
- b) Explain with neat sketch, wind energy conversion systems and classify wind mills. 6 M

## **UNIT-III**

5. a) Explain about closed cycle type OTEC system with neat sketch 7 M
- b) State the basic principle of tidal energy production and write major components of tidal power plant 7 M

**(OR)**

6. a) Explain the working principle of Ocean thermal energy with neat diagram and write its advantages. 7 M
- b) Describe the importance of earthquakes and volcanoes in the formation of geothermal resources 7 M

## **UNIT-IV**

7. a) What is biomass? What are the benefits of using biomass for power generation? 8 M
- b) Explain the classification, advantages and disadvantages of bio-mass energy 6 M

**(OR)**

8. a) Explain various sources of Bio-Mass energy 7 M
- b) Briefly explain the different types of bio-gas plants with its schematic diagrams 7 M

## **UNIT-V**

9. a) Explain the working principle of MHD power generation with neat diagram and writes its advantages. 7 M
- b) Discuss briefly Joule's effect, Seebeck effect, Thompson effect and Peltier effect 7 M

**(OR)**

10. a) Explain in detail different types of fuel cells 8 M
- b) Explain the types of MHD generators 6 M

# AR16

**CODE: 16ME4035**

**SET-1**

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

**IV B.Tech II Semester Supplementary Examinations, June, 2022**

**UNCONVENTIONAL MACHINING PROCESSES**

**(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 importance of Unconventional Machining Processes 7 M
- b) Discuss the classification of Unconventional Machining Processes 7 M

**(OR)**

2. a) Write the advantages and disadvantages of USM process 8 M
- b) Explain the various parameters influencing the MRR in USM process 6 M

## **UNIT-II**

3. a) How is metal removed in abrasive jet machining process? Explain the mechanism with neat diagram 7 M
- b) Distinguish between abrasive flow finishing and Magnetic abrasive finishing process 7 M

**(OR)**

4. a) Explain the Abrasive Flow Finishing process 7 M
- b) Explain the process elements of abrasive flow finishing process 7 M

## **UNIT-III**

5. a) List the advantages and disadvantages of ECM process 7 M
- b) Explain the process of metal removal in Electro Chemical Grinding 7 M

**(OR)**

6. a) Describe the parameters and applications of chemical machining process 8 M
- b) Briefly discuss the economics of ECM process 6 M

## **UNIT-IV**

7. a) Explain the Electro discharge machining process with a neat sketch 7 M
- b) Discuss the applications of Wire EDM process 7 M

**(OR)**

8. a) Explain the functions and characteristics of dielectric fluid used in EDM process 8 M
- b) Comment about the nature of spark eroded surfaces 6 M

## **UNIT-V**

9. a) Describe about various process parameters effecting electron beam machining process 7 M
- b) State the mechanism of metal removal, merits and demerits of laser beam machining process 7 M

**(OR)**

10. a) Explain about plasma arc machining process with a neat sketch 8 M
- b) Compare the plasma arc cutting with oxy-acetylene cutting process based on the process, merits and demerits 6 M

# AR16

**CODE: 16EC4037**

**SET-2**

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

**IV B.Tech II Semester Regular & Supplementary Examinations, June-2022**

**EMBEDDED & REAL TIME OPERATING SYSTEMS  
(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) List and define the three main IC processor technologies. What are the benefits of using each of the three different processor technologies? 7M  
b) Draw and explain basic processor architecture in terms of controller and data path 7M
- (OR)**
2. a) Explain RT level custom single purpose processor design with example? 7M  
b) Write short notes on application specific instruction set processors? 7M

**UNIT-II**

3. a) Draw and explain the elevator 's unit control process using state machine 7M  
b) Explain about concurrent process model 7M
- (OR)**
4. a) Explain about HCFSM architecture with example 7M  
b) Explain about dataflow model 7M

**UNIT-III**

5. a) Explain about USB 7M  
b) Explain about IEEE802.11 7M
- (OR)**
6. a) Explain about Infrared communication 7M  
b) What is the need of communication interfaces 7M

**UNIT-IV**

7. a) Write different scheduling algorithms 7M  
b) What is semaphore? Write its significance 7M
- (OR)**
8. a) What is a Task? Write different task states ? 7M  
b) Explain the operation of Interrupt service routines 7M

**UNIT-V**

9. a) What is Priority inversion problem 7M  
b) Explain about Real time operating systems 7M
- (OR)**
10. a) List various commercially available embedded operating systems and explain their features 7M  
b) What is the need of a OS? What are different categories of OS 7M

# AR16

**CODE: 16CS4036**

**SET-1**

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

**IV B.Tech II Semester Regular & Supplementary Examinations, June, 2022**

**MOBILE AD HOC AND SENSOR NETWORKS  
(Common to CSE & IT)**

**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) Discuss the characteristics of MANETs. 7M  
b) Explain in detail Ad Hoc Wireless Networks. 7M  
(OR)
2. a) Discuss the Applications of Cellular Networks. 7M  
b) Write short notes on Ad Hoc Wireless Internet. 7M

**UNIT-II**

3. a) Explain the design goals of a MAC Protocol for Ad Hoc Wireless Networks. 7M  
b) Explain FAMA Contention – Based Protocol. 7M  
(OR)
4. a) Explain D-PRMA Contention – Based Protocol with Reservation Mechanisms. 7M  
b) Explain DWOP - Contention – Based MAC Protocol with Scheduling Mechanisms 7M

**UNIT-III**

5. a) Discuss the issues in designing a Routing Protocol for Ad Hoc Wireless Networks. 7M  
b) Explain WRP Table –Driven Routing Protocol. 7M  
(OR)
6. a) Explain DSR On- Demand Routing Protocol. 7M  
b) Explain CEDAR Hybrid routing Protocol. 7M

**UNIT-IV**

7. a) Compare Wireless Sensor Networks with Ad Hoc Wireless Networks. 7M  
b) Discuss briefly about the challenges in designing a Sensor Network. 7M  
(OR)
8. a) Explain the Layered architecture of Wireless Sensor Network. 7M  
b) Discuss various applications of Sensor Networks. 7M

**UNIT-V**

9. a) Discuss briefly about various MAC Protocols for Sensor Networks. 7M  
b) Write short notes on Sensor Network localization. 7M  
(OR)
10. Explain Hybrid TDMA/FDMA based MAC Protocol. 14M

# AR13

**CODE: 13ME4040**

**SET-1**

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

**IV B.Tech II Semester Regular & Supplementary Examinations, June, 2022**

**UNCONVENTIONAL MACHINING PROCESSES  
(Mechanical Engineering)**

**Time: 3 Hours**

**Max Marks: 70**

**PART-A**

**ANSWER ALL QUESTIONS**

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

1. a) Enlist any requirement that demand the use of Unconventional machining process
- b) State the main Function of slurry in USM.
- c) State the main Function of concentrator in USM.
- d) Show the effect of standoff distance on material removal rate in AJM with a diagram
- e) State faradays law of electrolysis
- f) State main parameter that influence the performance of chemical milling process.
- g) What is the necessity of creating vacuum around Electron beam machining process.
- h) State the main reason for Material removal in plasma arc machining
- i) Draw the diagram labelling main components in Electro chemical honing.
- j) Write any two types of crystals that are used to generate LASER in LBM.

**PART-B**

**Answer one question from each unit**

**[5x12=60M]**

**UNIT-I**

2. a) Explain the important characteristics of any six Unconventional Processes **6M**
- b) Explain the need of using unconventional machining processes. **6M**
- (OR)**
3. a) Explain the tool feed mechanism used in ultrasonic machining with sketch. **6M**
- b) Draw the simple sketch of Ultrasonic Machine, label the important components on it and explain. **6M**

## **UNIT-II**

4. a) What are the different types of abrasive slurries? Explain their important characteristics. **6M**  
b) Explain the effect of 'grain size' and 'pressure' on the accuracy and rate of metal removal of in abrasive water jet machining. **6M**
- (OR)**
5. a) What is Abrasive Jet machining and Abrasive Water Jet Machining? Write differences between them. **6M**  
b) List out applications, advantages and disadvantages of water jet machining. **6M**

## **UNIT-III**

6. a) Explain the various process parameters that affect the surface finish of component machined using ECM process. **6M**  
b) What are the different types of electrolytes used in ECM? Explain their characteristics.. **6M**
- (OR)**
7. a) What is mask in Chemical Machining process? Discuss the different methods of preparing the masks. **6M**  
b) Discuss the advantages and limitations of chemical machining process **6M**

## **UNIT-IV**

8. a) Write any two applications, advantages and disadvantages of EDM process. **6M**  
b) Draw the simple sketch of Electro Discharge Machine and explain the important elements. **6M**
- (OR)**
9. a) Discuss the various input parameters that affect the quality of the product produced on electric discharge machine. **6M**  
b) Explain the different types of errors occurred while machining the material using EDM? **6M**

## **UNIT-V**

10. a) Explain the principle and process of electron beam machining with a sketch. **6M**  
b) Explain the process of laser beam machining and state any two applications. **6M**
- (OR)**
11. a) What is transferred mode of plasma arc? Explain the advantages and differences between transferred and non-transferred mode of plasma arc. **6M**  
b) Explain the features of an electron gun used electron beam machining with a sketch.. **6M**