

**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 remote sensing? Explain different stages of remote sensing with neat sketch. 7  
b) List some of the Advantages of remote sensing: and its application. 7
- (OR)
2. a) Explain spectral reflectance curve with respect to water especially in VIS and NIR. 7  
b) What do you mean by scattering and absorption? Explain non-selective scattering with examples. 7

**UNIT-II**

3. a) Explain briefly Geostationary Satellites and Sun-synchronous satellites. 7  
b) Explain natural colour image, false colour composite (FCC) image and raw data digital product. 7
- (OR)
4. a) Explain image processing and band interleaved by pixel (BIP) and BIL image format with neat sketch. 7  
b) Classify sensors and explain any three of passive sensors and their applications. 7

**UNIT-III**

5. a) Explain at least 7 basic elements of Image interpretation. 7  
b) Explain image enhancement. Describe histogram equalisation and linear contrast adjustment method. 7
- (OR)
6. a) Explain interpretation keys used in image processing. 7  
b) Explain unsupervised classification with example. 7

**UNIT-IV**

7. a) Explain the function of software components of GIS. 7  
b) Define geospatial data. Explain advantages and potential application of GIS. 7
- (OR)
8. a) Define map projection. Explain map projection class based on developable surface. 7  
b) Explain run length encoding and quad tree raster data model. 7

**UNIT-V**

9. a) Explain the following terminologies in vector overlay analysis with sketches. 6  
b) Discuss the role of RS& GIS in agriculture? 8
- (OR)
10. a) Write about arithmetic operators and arithmetic function with neat sketch. 7  
b) Discuss the application of RS&GIS in forest mapping. 7

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**UNIT-I**

1. State and explain the important features of various braking methods of dc motor. [14M]

**(OR)**

2. a) Recall four quadrant operation of a motor driving a hoist load. [9M]  
b) Describe the operation of closed-loop torque control scheme. [5M]

**UNIT-II**

3. a) Explain with relevant speed torque characteristics of a fully controlled fed separately excited DC drive. [10M]

- b) A 200V, 875 rpm, 150A separately excited dc motor has an armature resistance of  $0.06\Omega$ . it is fed from a single phase fully-controlled rectifier with an ac source voltage of 220V, 50Hz. Assuming continuous conduction, calculate firing angle for rated motor torque and 750 rpm. [4M]

**(OR)**

4. a) Derive an expression for average output voltage of three phase full controlled fed DC drive. [10M]

- b) Explain the differences between continuous and discontinuous mode of operation. [4M]

**UNIT-III**

5. a) Construct chopper circuit that can operate the dc separately excited motor in motoring and regenerative braking in forward direction. Explain with speed torque characteristics. [7M]

- b) A 220V, 24A, 100 rpm, separately excited dc motor has an armature resistance of  $2\Omega$ . Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm. [7M]

**(OR)**

6. a) Explain the operation of four quadrant chopper fed DC drive [10M]

- b) Draw and explain motoring characteristics of chopper controlled dc series motor. [4M]

**UNIT-IV**

7. a) Explain any speed control method of induction motor from stator side. [7M]

- b) Explain control of induction motor by ac voltage controllers [7M]

**(OR)**

8. a) For variable frequency control of induction motor speeds below base speed v/f ratio is maintained constant, why? [7M]

- b) Discuss briefly voltage source inverter controlled induction motor drives. [7M]

**UNIT-V**

9. a) Explain about static Scherbius drive. [10M]

- b) Why rotor resistance control method is also called slip power regulating method? [4M]

**(OR)**

10. a) Explain operation of self-controlled synchronous motor drive employing load commutated inverter [9M]

- b) Give the advantages and applications of Kramer drive. [5M]

**Time: 3 Hours****Max Marks: 70**

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**UNIT-I**

1. a) List out any four advantages of fluid power system? 7M
- b) Define pump? How pumps are classified? What are the factors to be considered for pump selection? 7M

**(OR)**

2. a) Give any four important properties of hydraulic fluids 8M
- b) Define gear pump? How gear pumps are classified? 6M

**UNIT-II**

3. a) What are the different types of accumulators in use? Draw the circuit connections of a hydraulic accumulator. 8M
- b) What is the purpose of pressure control valves and explain different types of pressure control valves. 6M

**(OR)**

4. a) What are the formulae used in selecting the size of an accumulator? 6M
- b) Draw a simple hydro-pneumatic intensifier and explain its working principle. 8M

**UNIT-III**

5. Explain the speed control circuit for hydraulic motor using meter-in and meter-out circuits. 14M

**(OR)**

6. a) Draw a sketch and mark the standard accessories in a hydraulic power unit. 8M
- b) Evaluate the pump capacity required in case of clamping for the hydraulic power unit having 8cm clamping cylinder bore diameter and 1.5m/min clamping speed. Estimate the working pressure for the 600kg load of the clamping cylinder. 6M

**UNIT-IV**

7. a) Mention four applications in which compressed air is used? 4M
- b) With the help of neat sketches explain any two types of reciprocating compressors. 10M

**(OR)**

8. a) Mention the prime movers, and also the possibilities of linear/rotary motions using pneumatic, hydraulic and electrical systems. 6M
- b) Present the graphic symbols (i) Push button-operated, spring return; (ii) Single-solenoid, spring return; and (iii) double solenoid, for 5/2 direction control valve 8M

**UNIT-V**

9. a) Differentiate a control air from signal air with illustration. 4M
- b) Explain the mechanism of AND gate and OR gate with circuit diagram. Draw the symbol. 10M

**(OR)**

10. a) Illustrate the signal air 12 shifting the position of the direction control valve to flow the compressed air from 1 and 2. The air is getting exhausted from 2 to 3 prior to making of the effective signal. Explain the significance of the designated 12. Draw a figure designating the signal air by 10 to shift the position of the valve to block the compressed air supply. 8M
- b) Describe briefly pneumatic vacuum system with three applications. 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)****IV B.Tech I Semester Regular & Supplementary Examinations, February-2021****MICROWAVE ENGINEERING  
(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 the applications of Microwave frequencies 7M  
b) Analyze the TM Mode of propagation in rectangular wave guide 7M  
(OR)
2. a) Analyze the Dominant mode of propagation in rectangular wave guide 7M  
b) Derive the Resonant frequency of the rectangular cavity resonator 7M

**UNIT-II**

3. a) Analyze the [S] matrix of EH plane tee junction. 7M  
b) Discusses in brief about the operation of circulator 7M  
(OR)
4. a) How Directional coupler is different from remaining passive junctions and analyze its scattering matrix 7M  
b) List the Properties of scattering matrix 7M

**UNIT-III**

5. a) Discusses in brief about the limitations of the conventional devices at high frequency 7M  
b) Analyze the velocity modulation process of two cavity Klystron 7M  
(OR)
6. a) With Apple gate diagram explain mode analysis of Reflex klystron 7M  
b) Discusses in brief about the bunching process of two cavity klystron 7M

**UNIT-IV**

7. a) Explain the concept of amplification in TWT. 7M  
b) Explain the importance of  $\omega$ - $\beta$  diagram in travelling wave tube 7M  
(OR)
8. a) Describe the mechanism of interaction between electrons and fields, and account for the energy delivery and build up of oscillations in a Cylindrical Magnetron, with neat sketches. 7M  
b) Express Hull cut off Magnetic field for a fixed voltage  $V_0$  in the cylindrical magnetron. 7M

**UNIT-V**

9. a) Explain how an IMPATT diode exhibits a differential negative resistance 7M  
b) Analyze the attenuation measurement at high frequency 7M  
(OR)
10. a) Analyze the negative resistance characteristics of Avalanche transit time diode 7M  
b) Explain clearly about the VSWR measurement using Microwave bench setup. 7M

**CODE: 16CS4024** **SET-1**  
**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**  
**(AUTONOMOUS)**

**IV B.Tech I Semester Regular & Supplementary Examinations, February-2021**

**UML & DESIGN PATTERNS**

**(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) What are the common modelling techniques of object diagram? Explain. 7M  
b) Draw and Explain Object diagram that contain a three level hierarchy of objects. 7M

**(OR)**

2. a) Explain Software development life cycle process. 7M  
b) What is UML? List and explain how the UML can be applied. 7M

**UNIT-II**

3. a) Compare sequence and collaboration diagrams with examples. 7M  
b) Draw component diagram and explain with suitable example. 7M

**(OR)**

4. a) What are activity diagrams? Explain the symbols used in activity diagram with examples. 7M  
b) Explain deployment diagram with suitable example. 7M

**UNIT-III**

5. a) What are the differences between component and deployment diagrams? What are the types of components in UML? 7M  
b) Give an overview on component diagram. 7M

**(OR)**

6. a) Give the deployment diagram for client server 2 tier, event registration System. 7M  
b) Explain the steps to model executables and source code using component diagrams. 7M

**UNIT-IV**

7. a) Write and explain the design principles of package design? 7M  
b) What are the participants in command design pattern and explain their roles. 7M

**(OR)**

8. a) Explain design pattern in small talk MVC. 7M  
b) Explain how to use a design pattern? 7M

**UNIT-V**

9. a) List out the benefits of singleton pattern? Explain the implementation issues considered when using singleton pattern 7M  
b) Write in detail about bridge design pattern. 7M

**(OR)**

10. a) Write the structure of Abstract Factory pattern and explain the participants that Participate in it. 7M  
b) Explain briefly about composite pattern? 7M

**MICROWAVE ENGINEERING  
(Electronics & Communication Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What is Microwave Frequency & Wavelength range
- b) Write down the difference between Dominant and Degenerate modes.
- c) What is a Scattering Matrix?
- d) Write about Coupling Probes.
- e) What is meant by Velocity modulation?
- f) What are the applications of two-cavity klystron.
- g) What are slow wave structures?
- h) What is the main advantage of TWT over a multi cavity klystron.
- i) Give the classification of solid state microwave devices.
- j) Draw the block diagram of microwave bench setup.

**PART-B****Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Derive the expression for cut-off frequency for a rectangular wave guide. 6M
- b) A waveguide operating in the TE<sub>10</sub> mode has dimensions  $a = 2.26$  cm and  $b = 1$  cm. The waveguide length is 4 cm. Find the a) cut-off frequency of propagating mode b) frequency of operation c) maximum frequency propagation of guide. 6M

**(OR)**

3. a) Make use of fundamental concepts of waveguide and derive expressions for phase velocity, group velocity and wave impedance. 6M
- b) What are cavity Resonators? Derive the equations for resonant frequencies for a rectangular cavity resonator. 6M

**UNIT-II**

4. a) Explain the working of a two-hole directional coupler with neat diagram and give the expression for the coupling and directivity of a two-hole directional coupler. 6M
- b) Discuss the operation of Magic Tee Junction and Derive its scattering matrix with the help of the properties. 6M

**(OR)**

5. a) Explain Faraday Rotation Principle and Discuss the working of a Ferrite Isolator. 6M
- b) Find the S-Matrix of a three port Circulator with an insertion loss of 0.5 dB, an isolation of 15 dB and a VSWR of 1.5. 6M

**UNIT-III**

6. a) Derive the equation of velocity modulation for a two cavity Klystron Amplifier. 6M
- b) Discuss in detail about the limitations of Conventional tubes at microwave frequencies. 6M

**(OR)**

## AR13

**CODE: 13EC4029**

**SET-1**

7. a) Illustrate the working of a Reflex Klystron with the help of “applegate” diagram. 6M  
b) Determine the values of i) transit time at cavity gap ii) transit angle iii) velocity of electrons in the gap, of a cavity klystron with two cavities, operating at 4GHz, with RF input voltage at 50KV, gap voltage of 100 V and capacity gap is 4.5mm 6M

### UNIT-IV

8. a) Discuss the modes of resonance and “ $\pi$ ” mode operation of a Magnetron. 6M  
b) Define Hartree voltage and Derive the expression for Hartree Condition. 6M

**(OR)**

9. a) Explain why there are four propagation constants in TWT & derive equations to those propagation constants 6M  
b) The magnetic flux density of a normal circular magnetron is  $0.2 \text{ Wb/m}^2$  and find the cut-off magnetic flux density if  $V_0=20 \text{ kV}$ . If the cathode radius =2 mm and anode radius=4mm , then determine the Hull cut-off voltage. 6M

### UNIT-V

10. a) Justify how RWH theory can be used to analyze the working of GUNN diode in different modes. 6M  
b) Compare the construction and working performance of IMPATT & TRAPATT diodes. 6M

**(OR)**

11. a) Describe briefly the equipment that is used to measure impedance using a slotted line. 6M  
b) What is VSWR? Discuss the measurement of low and high VSWR. 6M