

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. With neat sketches, explain the inversions of Four-bar chain and Single-slider crank chain and state their practical applications.

Marks	CO	BTL
14M	CO1	L2

(OR)

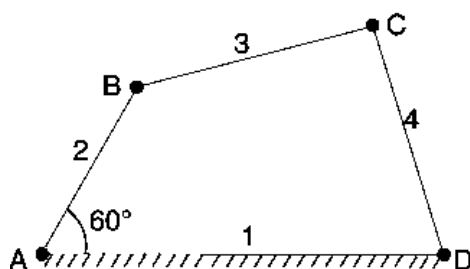
2. a) Explain different types of constrained motions with neat sketches
b) Define and differentiate between Kinematic Pair, Kinematic Chain, Mechanism, and Machine with suitable examples.

7M	CO1	L2
7M	CO1	L2

UNIT-II

3. Locate all the instantaneous centres for a four bar mechanism as shown in Fig. The lengths of various links are : AD = 125 mm ; AB = 62.5 mm ; BC = CD = 75 mm. If the link AB rotates at a uniform speed of 10 r.p.m. in the clockwise direction, find the angular velocity of the links BC and CD

14M	CO2	L3
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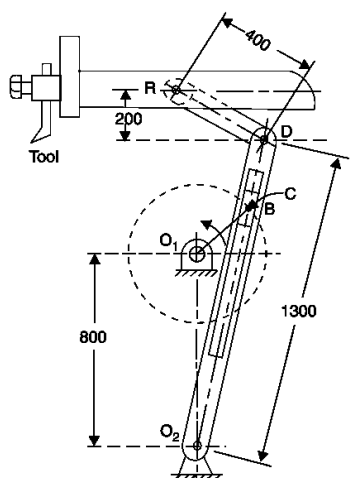


(OR)

4. A quick return mechanism of the crank and slotted lever type shaping machine is shown in Fig. The dimensions of the various links are as follows :

14M	CO2	L3
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$O_1O_2 = 800$ mm ; $O_1B = 300$ mm ; $O_2D = 1300$ mm ; $DR = 400$ mm. The crank O_1B makes an angle of 45° with the vertical and rotates at 40 r.p.m. in the counter clockwise direction. Find : 1. velocity of the ram R, or the velocity of the cutting tool, and 2. angular velocity of link O_2D .

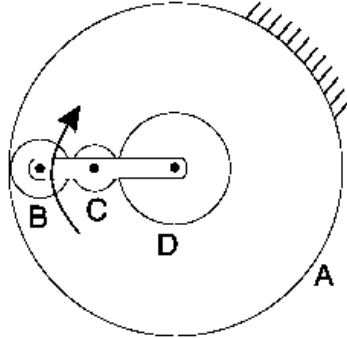
**UNIT-III**

5. a) Derive an expression for the length of the arc of contact in a pair of meshed spur gears.
b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.

7M	CO3	L4
7M	CO3	L3

(OR)

6. An epicyclic gear train, as shown in Fig. is composed of a fixed annular wheel A having 150 teeth. The wheel A is meshing with wheel B which drives wheel D through an idle wheel C, D being concentric with A. The wheels B and C are carried on an arm which revolves clockwise at 100 r.p.m. about the axis of A and D. If the wheels B and D have 25 teeth and 40 teeth respectively, find the number of teeth on C and the speed and sense of rotation of C.



UNIT-IV

7. a) Derive the expression for Angular Velocity and Acceleration of the Connecting Rod 7M CO4 L4
b) A vertical double acting steam engine has a cylinder 300 mm diameter and 450 mm stroke and runs at 200 r.p.m. The reciprocating parts has a mass of 225 kg and the piston rod is 50 mm diameter. The connecting rod is 1.2 m long. When the crank has turned through 125° from the top dead centre, the steam pressure above the piston is 30 kN/m^2 and below the piston is 1.5 kN/m^2 . Calculate the effective turning moment on the crank shaft. 7M CO4 L3

(OR)

8. The turning moment diagram for a multicylinder engine has been drawn to a scale of $1 \text{ mm} = 4500 \text{ N-m}$ vertically and $1 \text{ mm} = 2.4^\circ$ horizontally. The intercepted areas between output torque curve and mean resistance line taken in order from one end are 342, 23, 245, 303, 115, 232, 227, 164 mm^2 , when the engine is running at 150 r.p.m. If the mass of the flywheel is 1000 kg and the total fluctuation of speed does not exceed 3% of the mean speed, find the minimum value of the radius of gyration. 14M CO4 L3

UNIT-V

9. a) Discuss the effect of gyroscopic couple on naval ships with neat sketches 7M CO5 L2
b) The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship:
1. when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.
2. when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees. 7M CO5 L3

(OR)

10. A Hartnell governor having a central sleeve spring and two right-angled bell crank levers moves between 290 r.p.m. and 310 r.p.m. for a sleeve lift of 15 mm. The sleeve arms and the ball arms are 80 mm and 120 mm respectively. The levers are pivoted at 120 mm from the governor axis and mass of each ball is 2.5 kg. The ball arms are parallel to the governor axis at the lowest equilibrium speed. Determine : 1. loads on the spring at the lowest and the highest equilibrium speeds, and 2. stiffness of the spring. 14M CO5 L3

Answer ONE Question from each Unit

All Questions Carry Equal Marks

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Describe the structure of a standard HTML5 document with an example.	7	CO1	L2
	b) Explain CSS box model properties (margin, border, padding, content) with diagrams.	7	CO1	L3
(OR)				
2.	a) Discuss various HTML form elements and input types with examples.	7	CO1	L3
	b) Illustrate the difference between GET and POST methods in HTML forms with example code.	7	CO1	L3
<u>UNIT-II</u>				
3.	a) What are JavaScript expressions and operators? Explain with examples.	7	CO2	L2
	b) Explain arrays in JavaScript. Write a program to find the largest element in an array.	7	CO2	L3
(OR)				
4.	a) Write JavaScript programs to demonstrate if-else and switch statements.	7	CO2	L3
	b) Define a JavaScript function. Write a program to find the factorial of a number using a function.	7	CO2	L3
<u>UNIT-III</u>				
5.	a) Explain SAX parser in XML with example code.	7	CO3	L2
	b) What are XML schemas? Discuss their advantages over DTD.	7	CO3	L2
(OR)				
6.	a) Define DTD. Write a sample XML document with internal DTD.	7	CO3	L2
	b) Write and explain the basic structure of an XML document.	7	CO3	L4
<u>UNIT-IV</u>				
7.	a) Illustrate the architecture of JDBC with a neat diagram.	7	CO4	L3
	b) Explain different stages in servlet execution (init, service, destroy) with example code.	7	CO4	L2
(OR)				
8.	a) Discuss the four types of JDBC drivers with examples.	7	CO4	L3
	b) Write a servlet program to read form parameters and display them on the browser.	7	CO4	L3
<u>UNIT-V</u>				
9.	a) Explain the JSP life cycle methods (jspInit(), _jspService(), jspDestroy()) in detail.	7	CO5	L2
	b) Describe the role of JSP scripting elements with examples.	7	CO5	L2
(OR)				
10.	a) Write a JSP program to manage library books (book_id, title, author, availability) using MySQL.	7	CO5	L6
	b) Explain the role of JSTL tags in JSP. Give suitable examples.	7	CO5	L2

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

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UNIT-I

- | | | Marks | CO | BTL |
|----|---|-------|----|-----|
| 1. | a) Explain the two transistor analogy of SCR | 6 | 1 | K2 |
| | b) Explain about power MOSFET with their construction and characteristics | 8 | 1 | K2 |

(OR)

- | | | | | |
|----|---|---|---|----|
| 2. | a) What is commutation? Explain any two commutation methods of SCR. | 8 | 1 | K2 |
| | b) What is Power Electronics and what is its importance? | 6 | 1 | K2 |

UNIT-II

- | | | | | |
|----|---|---|---|----|
| 3. | a) A single phase 220 V, 500W resistive is connected to a half-wave controlled rectifier and fed from a 220 V, 50 Hz AC supply, Determine the power absorbed by the heater when the firing angle is i) $\alpha = 45^\circ$ and ii) $\alpha = 120^\circ$ | 7 | 2 | K3 |
| | b) Draw and explain the operation of three phase dual converter | 7 | 2 | K2 |

(OR)

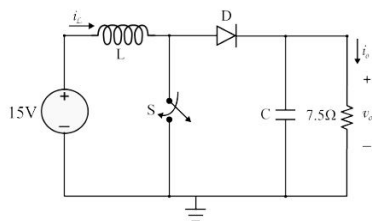
- | | | | | |
|----|--|---|---|----|
| 4. | a) A single phase fully controlled bridge converter with RL load is supplied from 220 V, 50 Hz ac supply. If the firing angle is 45° , determine i) average output voltage, ii) output current iii) input power factor. | 7 | 2 | K3 |
| | b) Explain the operation of three phase half controlled rectifier with R load. | 7 | 2 | K2 |

UNIT-III

- | | | | | |
|----|--|----|---|----|
| 5. | a) Draw a neat circuit and explain the operation of a dc-dc converter in which the output voltage is always greater than the input voltage. Also, derive the relation between output and input voltages. | 10 | 3 | K2 |
| | b) What is duty ratio? | 4 | 3 | K2 |

(OR)

- | | | | | |
|----|---|----|---|----|
| 6. | For the buck converter with input voltage of 24 V and load resistance of 10 ohms. The duty ratio of the controllable switch is 40% and its switching frequency is 50kHz. For the minimum and maximum values of the inductor current to be 6A and 10A respectively, determine (i) the value of inductance required. (ii) minimum value of smoothing capacitor to be used such that the output voltage peak-to-peak magnitude (V_o) remains limited to 10% of output voltage. | 14 | 3 | K3 |
|----|---|----|---|----|

**UNIT-IV**

- | | | | | |
|----|---|---|---|----|
| 7. | a) Explain the operation of a single-phase half bridge inverter with an R- load | 8 | 4 | K2 |
| | b) What is modulation? Explain any one in detail | 6 | 4 | K2 |

(OR)

- | | | | | |
|----|---|----|---|----|
| 8. | Explain the operation of 3-phase inverter in 180° mode of operation with neat circuit diagram, line and phase voltage waveforms. | 14 | 4 | K2 |
|----|---|----|---|----|

UNIT-V

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|----|--|---|---|----|
| 9. | a) Describe the working of the 1-Phase cyclo converter with R load and draw the relevant waveforms | 7 | 5 | K2 |
| | b) A single-phase full-wave AC voltage controller is connected with a load of $R = 50 \Omega$ with an input voltage of 230 V, 50 Hz. If the firing angle of the thyristor is 60° , determine i) RMS output voltage, ii) Power delivered to load | 7 | 5 | K3 |

(OR)

- | | | | | |
|-----|--|----|---|----|
| 10. | a) Describe the working of the 1-Phase AC voltage controller with RL load and draw the relevant waveforms for firing angle of 60° | 10 | 5 | K2 |
| | b) What is circulating current in cycloconverter? Explain | 4 | 5 | K2 |

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- | | | <u>UNIT-I</u> | Marks | CO | BTL |
|-----|----|--|-------|-----|-----|
| 1. | a) | Explain about frequency domain representation of frequency domain time signals. | 7M | CO1 | L2 |
| | b) | Test the stability of the system whose impulse response is given by | 7M | CO1 | L3 |
| | | (i) $h(n) = 2^n u(-n)$ ii) $h(n) = \sin \frac{n\pi}{2}$ iii) $h(n) = \delta(n) + \sin \pi n$ | | | |
| | | (OR) | | | |
| 2. | a) | State and Prove linearity and symmetry property of DFS | 7M | CO1 | L3 |
| | b) | Determine the frequency response for the following system and plot magnitude and phase response | 7M | CO1 | L3 |
| | | $y(n) + \frac{1}{4} y(n-1) = x(n) - x(n-1)$ | | | |
| | | <u>UNIT-II</u> | | | |
| 3. | a) | Find out the IDFT of $X(K) = \{3, 2+j, 1, 2-j\}$ | 7M | CO2 | L3 |
| | b) | State and prove linearity and circular convolution property of DFT | 7M | CO2 | L3 |
| | | (OR) | | | |
| 4. | a) | An 8-point sequence is given by $x[n] = \{1, 2, 3, 4, 4, 3, 2, 1\}$. Compute 8-point DFT of $x(n)$ using radix-2 DIF FFT algorithm | 7M | CO2 | L3 |
| | b) | Explain inverse FFT algorithms | 7M | CO2 | L2 |
| | | <u>UNIT-III</u> | | | |
| 5. | a) | Explain impulse invariant technique and what are the advantages | 7M | CO3 | L2 |
| | b) | Realize the system given by difference equation $y(n) = \frac{3}{4} y(n-1) - \frac{1}{8} y(n-2) + x(n) + \frac{1}{3} x(n-1)$ in cascade form | 7M | CO3 | L3 |
| | | (OR) | | | |
| 6. | a) | Explain frequency warping and its effect in Bilinear transformation | 4M | CO3 | L2 |
| | b) | Design analog chebyshev low pass type 1 filter with a maximum pass band attenuation of 2.5 dB at pass band frequency = 20 rad/sec and stop band attenuation of 30 dB at stop band frequency of 50 rad/sec. | 10 M | CO3 | L3 |
| | | <u>UNIT-IV</u> | | | |
| 7. | a) | Explain frequency sampling method of FIR filter design | 7M | CO4 | L2 |
| | b) | The frequency response of FIR low pass filter is given by | 7M | CO4 | L3 |
| | | $H_d(e^{j\omega}) = 1 \text{ for } -\frac{\pi}{2} \leq \omega \leq \frac{\pi}{2}$ | | | |
| | | $= 0 \text{ for } \frac{\pi}{2} \leq \omega \leq \pi$ | | | |
| | | Determine the filter coefficients for $N=11$ using Rectangular window. | | | |
| | | (OR) | | | |
| 8. | a) | Explain Direct form realization of Linear Phase FIR filter | 7M | CO4 | L2 |
| | b) | Explain Hanning window and Hamming window | 7M | CO4 | L2 |
| | | <u>UNIT-V</u> | | | |
| 9. | | Draw the architecture of TMS320C67X DSP processor and explain the function of each block in detail. | 14M | CO5 | L2 |
| | | (OR) | | | |
| 10. | a) | Explain Arithmetic logic unit of TMS320C54X with the help of diagram | 7M | CO5 | L2 |
| | b) | Explain data addressing capabilities of Programmable DSP processor | 7M | CO5 | L2 |

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

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	<u>UNIT-I</u>	Marks	CO	BTL
1. a)	Differentiate between World Wide Web (WWW) and the Internet.	7	1	L1
b)	Explain the concept of URL and its various components with an example.	7	1	L2
	(OR)			
2. a)	Explain HTML Hypertext Links and Images with their attributes and examples.	7	1	L2
b)	Differentiate between inline, internal, and external CSS. Give an example for each.	7	1	L2
	<u>UNIT-II</u>			
3. a)	Explain pattern matching using regular expressions in JavaScript with a program.	7	2	L2
b)	Write a program to calculate the area of a circle using a function.	7	2	L2
	(OR)			
4. a)	Explain the concept of functions in JavaScript. How do you pass arguments to a function?	7	2	L2
b)	Write a JavaScript program to find the largest number among three given numbers using conditional statements.	7	2	L3
	<u>UNIT-III</u>			
5. a)	Explain how to perform form validation and form submission using Angular JS with a suitable example.	7	3	L2
b)	Write an XML document and its corresponding DTD to store information about students (name, roll number, marks).	7	3	L3
	(OR)			
6. a)	What is Document Type Definition (DTD)? Explain the different types of DTD with examples.	7	3	L2
b)	What is XML? Explain differences between HTML and XML.	7	3	L3
	<u>UNIT-IV</u>			
7. a)	Explain the different types of JDBC drivers in detail with a diagram.	7	4	L2
b)	Write a JDBC program to insert a new record into a table named 'Employee' with fields 'id' and 'name'.	7	4	L3
	(OR)			
8. a)	Explain the JDBC Architecture in detail.	7	4	L2
b)	Differentiate between Statement and Prepared Statement with respect to performance and security.	7	4	L3
	<u>UNIT-V</u>			
9. a)	Explain the life cycle of Servlets with a diagram.	7	5	L2
b)	Write a servlet program that reads data from an HTML form and displays it back to the user.	7	5	L3
	(OR)			
10. a)	Explain the JSP life cycle in detail.	7	5	L2
b)	Write a JSP program to count the number of times a user visits a webpage and display the count.	7	5	L3

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

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UNIT-I

- | | | Marks | CO | BTL |
|----|--|-------|-----|------------|
| 1. | a) The average annual rainfalls of 5 rain gauges in a basin are 89,54,45,41 and 55 cm. If the error in the estimation of basin mean rainfall should not exceed 10%, how many additional gauges should be installed in the basin? | 7M | CO1 | Evaluating |
| | b) What do you understand by dependable rainfall? How do you analyse the available data to obtain 75% dependable annual rainfall? | 7M | CO1 | Understand |

(OR)

- | | | | | |
|----|--|----|-----|------------|
| 2. | a) Describe how the evaporation is measured using atmometers. Also explain various methods of reducing the evaporation from a water body. | 7M | CO1 | Understand |
| | b) A seven hour storm produced the following rainfall intensities in mm/h at half an hour intervals over a basin of area 1830 km ² are 4, 9, 20, 18, 13, 11, 12, 2, 8, 16, 17, 13, 6 and 1. If the corresponding observed runoff is 36.6 million m ³ , estimate the ϕ -index. | 7M | CO1 | Evaluating |

UNIT-II

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|----|--|----|-----|------------|
| 3. | a) What is unit hydrograph? Discuss its uses and explain how a 6-hour unit hydrograph can be determined from a given 3-hour unit hydrograph. | 7M | CO2 | Understand |
| | b) Explain the procedure for derivation of Snyder's synthetic unit hydrograph for an ungaged catchment | 7M | CO2 | Apply |

(OR)

- | | | | | |
|----|---|----|-----|------------|
| 4. | a) Explain how the following parameters affect run-off:-
(i) Shape of basin, (ii) Slope of basin, (iii) Meteorological condition, (iv) Vegetative condition. | 7M | CO2 | Understand |
| | b) State and explain the Rational Method which is used for computing the peak rate of runoff for the design of urban storm water drains. What are the limitations of this method? | 7M | CO2 | Understand |

UNIT-III

5. a) State Dupuit's assumptions for obtaining general equations governing ground water flow. Derive an expression for the confined aquifer. How can the expression be used to evaluate the aquifer permeability? 7M CO3 Apply
- b) Explain the terms (i) cone of depression (ii) specific yield (iii) flowing well (iv) Darcy's velocity. 7M CO3 Understand

(OR)

6. a) Explain briefly various types of aquifers. 7M CO3 Understand
- b) A 20 cm well penetrates fully a confined aquifer of thickness 30 m. When the well is pumped at rate of 250 litre/minute the steady state drawdown in the two observation wells located at 10 m and 100 m distance from the pumping well are found to be 3.5 and 0.05 m respectively. Calculate the permeability and the transmissivity of the aquifer. 7M CO3 Evaluating

UNIT-IV

7. a) Explain the soil-moisture-irrigation relationship. How is the water requirement of crops determined? 7M CO4 Understand
- b) You are assigned to irrigate a 50-hectare farm with wheat and rice crops in rotation. Discuss which irrigation methods you would choose for each crop and justify your choice. 7M CO4 Apply

(OR)

8. a) A region receives rainfall of 600 mm/year, but crops require 900 mm/year. Discuss how you would supplement water efficiently and decide which irrigation method to adopt. 7M CO4 Apply
- b) What is consumptive use of water? Explain the methods of estimating evapotranspiration. 7M CO4 Understand

UNIT-V

9. a) Discuss design principle of a channel using Kennedy's method. 7M CO5 Understand
- b) A canal must cross a small stream in a hilly area. Logical reasoning: which cross-drainage structure is most suitable and why? 7M CO5 Apply

(OR)

10. a) Explain the necessity and types of cross-drainage works in irrigation systems. 7M CO5 Understand
- b) What is a regulator in canal? Differentiate between head regulator and cross regulator. 7M CO5 Understand

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

III B.Tech I Semester Supplementary Examinations, March-2026

**Modern Principles of Software Engineering
(Common to CSE (AIML) & CSE (DS) Branches)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Explain about the Waterfall model and mention the, advantages and limitations	7M	CO1	L2
b)	Demonstrate about the traditional software development and Agile approaches with real-world examples.	7M	CO1	L3
	(OR)			
2. a)	Demonstrate about the spiral model in detail with diagram.	7M	CO1	L3
b)	Illustrate the V-Model of software development. How does verification and validation occur at each stage?	7M	CO1	L3
	<u>UNIT-II</u>			
3. a)	Explain the Scrum framework in detail.	7M	CO2	L3
b)	Discuss Extreme Programming (XP) practices and their benefits for team collaboration.	7M	CO2	L4
	(OR)			
4. a)	Short notes on Agile tools : Jira, Trello, and Confluence	7M	CO2	L2
b)	Differentiate between Scrum and Kanban	7M	CO2	L3
	<u>UNIT-III</u>			
5. a)	Compare functional and non-functional requirements with examples.	7M	CO3	L3
b)	Discuss various requirements elicitation techniques.	7M	CO3	L3
	(OR)			
6. a)	Define requirements engineering and explain its importance in the software life cycle.	7M	CO3	L2
b)	Illustrate about change management.	7M	CO3	L3
	<u>UNIT-IV</u>			
7. a)	Differentiate between coupling and Cohesion.	7M	CO4	L3
b)	Explain about sequence diagram with examples.	7M	CO4	L4
	(OR)			
8. a)	Explain the activity diagram with an example.	7M	CO4	L3
b)	Short Notes: client-server, MVC, and microservices	7M	CO4	L3
	<u>UNIT-V</u>			
9. a)	Define software testing and explain the difference between black-box and white-box testing.	7M	CO5	L3
b)	Explain about the Equivalence Partitioning and Boundary Value Analysis in detail.	7M	CO5	
	(OR)			
10. a)	Differentiate white and black box testing.	7M	CO5	
b)	Explain about the Software Quality Assurance in detail.	7M	CO5	

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Draw Merchant's force diagram. State the assumptions made in the development of the diagram.	5	1	Remembering
b)	What is Tool signature? Explain the importance of various elements of it.	5	1	Understanding
	(OR)			
2. a)	What are the types of tool materials used in metal cutting? Discuss their importance.	5	1	Understanding
b)	Explain the difference between orthogonal cutting and oblique cutting.	5	1	Remembering
	<u>UNIT-II</u>			
3. a)	Explain thread cutting on lathe machine with neat sketch.	5	2	Understanding
b)	What are the different types of taper turning methods? Explain any one method with neat sketch.	5	2	Understanding
	(OR)			
4.	What are the types of automatic lathe machines? Explain any one type of automatic lathe machine with a neat sketch and its advantages and applications	10	2	Understanding
	<u>UNIT-III</u>			
5.	Sketch and explain the shaping machine working principle and its parts. Write its advantages and disadvantages.	10	3	Understanding
	(OR)			
6. a)	Sketch and explain the slotting machine working principle and its parts.	5	3	Understanding
b)	State and Explain the Quick Return mechanism with Neat Sketch	5	3	Understanding
	<u>UNIT-IV</u>			
7.	Explain the working principle of a surface broaching machine with a neat sketch. And write its advantages.	10	4	Remembering
	(OR)			
8.	Draw the block diagram of a horizontal milling machine and explain briefly its various parts.	10	4	Understanding
	<u>UNIT-V</u>			
9. a)	Sketch and explain the tool and cutter grinding machine.	5	5	Understanding
b)	What is grinding wheel explain the grinding wheel specifications.	5	5	Understanding
	(OR)			
10. a)	What are the types of gear hobbing?	5	5	Understanding
b)	Explain the operation of Abrasive Jet Machining?	5	5	Understanding
	<u>UNIT-VI</u>			
11.	Explain the different types of fits used in engineering practise with neat sketches.	10	6	Understanding
	(OR)			
12. a)	What are the advantages and disadvantages of unilateral and bilateral system of gauging?	5	6	Understanding
b)	Explain the hole basis and shaft basis system with a neat sketch.	5	6	Understanding

Time: 3 Hours**Max Marks: 60**

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Explain the turning on characteristics of SCR.	5	CO1	2
	b) Describe the basic behavior of thyristor using a two- transistor model	5	CO1	2
	(OR)			
2.	a) Draw the V-I characteristics of IGBT and explain it briefly?	5	CO1	2
	b) What are the different turning-on methods of a thyristor? Explain each method.	5	CO1	2
	<u>UNIT-II</u>			
3.	Explain the operation of a single-phase half-controlled rectifier with RL load and freewheeling diode. Derive the expression for average DC output voltage. Draw the relevant waveforms	10	CO2	2
	(OR)			
4.	a) A single phase 220 V, 750 W heater is connected to a half-wave controlled rectifier and fed from a 220 V, 50 Hz AC supply, Determine the power absorbed by the heater when the firing angle is i) $\alpha = 15^\circ$ and ii) $\alpha = 30^\circ$	6	CO2	3
	b) Explain how a free-wheeling diode improves the power factor in a converter.	4	CO2	2
	<u>UNIT-III</u>			
5.	Explain the operation of single – phase bridge rectifier with RL loads for firing angle of 45° if the supply frequency is 50Hz. Derive the expression for dc output voltage. Draw the relevant waveforms	10	CO3	3
	(OR)			
6.	a) A single phase fully controlled bridge converter with RL load is supplied from 220 V, 50 Hz ac supply. If the firing angle is 30° , determine i) average output voltage, ii) output current iii) input power factor.	6	CO3	3
	b) Explain the effect of source inductance in full wave rectifier with R load	4	CO3	2
	<u>UNIT-IV</u>			
7.	Draw the circuit diagram of a six-pulse converter with RL load. Discuss its working principle. Draw the voltage and current waveforms. Determine the following parameters: i) dc output voltage, ii) average dc load current, iii) rms output voltage, iv) rms load current.	10	CO4	3
	(OR)			
8.	Draw the circuit diagram of a 1-phase dual converter and explain its operation with neat waveforms.	10	CO4	2

UNIT-V

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|----|----|---|---|-----|---|
| 9. | a) | Describe the V-I characteristics of TRIAC and modes of operation. | 4 | CO5 | 2 |
| | b) | A single-phase half-wave AC voltage controller is connected with a load of $R = 50 \, \Omega$ with an input voltage of 220 V, 50 Hz. If the firing angle of the thyristor is 60° , determine i) RMS output voltage, ii) Power delivered to load. | 6 | CO5 | 3 |

(OR)

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|-----|--|--|----|-----|---|
| 10. | | Describe the working of the 1-Phase cyclo converter with RL load and draw the relevant waveforms | 10 | CO5 | 2 |
|-----|--|--|----|-----|---|

UNIT-VI

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|-----|----|---|---|-----|---|
| 11. | a) | Explain the operation of a boost converter with a neat circuit diagram and waveforms. | 4 | CO6 | 2 |
| | b) | Explain the operation of a single-phase full bridge inverter with an RL load | 6 | CO6 | 2 |

(OR)

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|-----|----|--|---|-----|---|
| 12. | a) | Derive the load voltage and current expressions of a step-down chopper | 6 | CO6 | 2 |
| | b) | Explain the types of modulation strategies used in an inverter with neat diagrams. | 4 | CO6 | 2 |

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

		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Explain the different types of network topologies.	5M	CO1	K2
	b) List the advantages of using the TCP/IP model over the OSI model?	5M	CO1	K3
(OR)				
2.	a) Describe the OSI reference model, detailing the functions of each layer.	5M	CO1	K2
	b) Discuss the evolution and structure of the Internet.	5M	CO1	K2
<u>UNIT-II</u>				
3.	a) Define framing. Explain various framing methods used in data transmission	5M	CO2	K3
	b) What is the role of flow control in the data link layer?	5M	CO2	K2
(OR)				
4.	a) Discuss the selective repeat ARQ protocol	5M	CO2	K2
	b) Explain the CRC error detection technique using generator polynomial x^4+x^3+1 and data 11100011.	5M	CO2	K4
<u>UNIT-III</u>				
5.	a) Describe the working of slotted ALOHA.	5M	CO3	K2
	b) Explain the concept of static channel allocation.	5M	CO3	K2
(OR)				
6.	a) Explain carrier sense multiple access with collision avoidance (CSMA/CA).	5M	CO3	K3
	b) Analyse the pros and cons of collision-based and collision-free protocols in MAC layer.	5M	CO3	K4
<u>UNIT-IV</u>				
7.	a) Explain the principles of congestion control in computer networks.	5M	CO4	K2
	b) What is multicast routing? Explain with an example.	5M	CO4	K2
(OR)				
8.	Given the following network with nodes A, B, C, D, and E: The cost to travel between A and B is 2, The cost to travel between A and C is 5, The cost to travel between B and D is 4, The cost to travel between C and D is 3, The cost to travel between D and E is 1. What is the shortest path from node A to node E using Dijkstra's algorithm? Show your calculations and explain each step.	10M	CO4	K4
<u>UNIT-V</u>				
9.	a) Explain connection-oriented transport protocols.	5M	CO5	K2
	b) Discuss the TCP segment header format.	5M	CO5	K2
(OR)				
10.	a) What is Quality of Service in networking, and why is it important?	5M	CO5	K2
	b) Discuss some techniques used to improve QoS in data transmission.	5M	CO5	K3
<u>UNIT-VI</u>				
11.	a) Write the short notes on E-Mail architecture.	5M	CO6	K2
	b) Explain the structure of the World Wide Web	5M	CO6	K2
(OR)				
12.	a) Compare FTP and HTTP protocols in terms of their use cases.	5M	CO6	K3
	b) List the differences between HTTP/1.1 and HTTP/2.	5M	CO6	K3

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 switching characteristics of power MOSFET and IGBT and compare them? 6M
- b) Describe the different modes of operation of a thyristor with the help of its static V-I characteristics? 6M

(OR)

2. Define string efficiency for series & parallel connected SCR's. Explain the operation of series and parallel connections of SCR's 12M

UNIT-II

3. a) Explain the working of single- phase full converter with relevant wave forms for RL-Load. 6M
- b) Derive the expression for output voltage of single-phase full converter by considering source inductance. 6M

(OR)

4. a) Explain the working of single- phase half-controlled converter with relevant wave forms for R- Load. 6M
- b) A single phase half controlled converter from a 120V, 50hz Ac supply. The load resistance is 10ohms. Determine the Average dc load voltage & Average dc load current for $\alpha=45^\circ$. 6M

UNIT-III

5. Draw the circuit diagram of three – phase, half –wave controlled rectifier with R load and explain its operating principle with voltage and current waveforms. Determine the following parameters for R load with firing angle $\alpha = 60^\circ$: i) DC output voltage ii) Average DC load current iii) RMS output voltage iv) RMS load current. 12M

(OR)

6. a) Explain with a neat circuit diagram the basic principle of Dual Converter 6M
- b) Explain with diagram the effect of source inductance on 3phase fully controlled bridge rectifier 6M

UNIT-IV

7. a) Explain the operation of single phase ac voltage controller with R load. And obtain expression for rms output voltage, rms output current and input power factor 6M
- b) A 1- ϕ full wave AC voltage controller feeds of R=20ohms with input voltage of 230,50HZ. Calculate (i)rms value of output voltage (ii) input power factor at $\alpha=45^\circ$ 6M

(OR)

8. Discuss the working of a single phase bridge type Cycloconverter with RL loads and for continuous waveform operation with neat circuit diagram and output rms voltage and current wave form for $f_o = (1/4) f_s$. 12M

UNIT-V

9. a) Discuss the principle of operation of Buck-Boost converter. 6M
- b) Explain the sinusoidal pulse width modulation. 6M

(OR)

10. a) Describe the working of single-phase full bridge inverter and draw the associated waveforms with R-Load 6M
- b) Discuss about the voltage control by means of PWM techniques 6M