1. With a neat circuit diagram and waveforms, explain the operation of a three-phase half-wave rectifier with RL load.
2. Discuss the harmonic analysis of a three-phase semi-converter.
3. Explain the working of a single-phase to single-phase bridge-type cycloconverter.
4. Describe the operation of an AC voltage controller with RL load and derive the expression for RMS output voltage.
5. Explain the working principle of a Boost Chopper with relevant diagrams.
6. For a buck converter with given parameters, determine its duty cycle, inductor current, and capacitor voltage ripple.
7. Discuss the operation of a buck-boost chopper with waveform diagrams.
8. Explain the working of a current source inverter with a circuit diagram.
9. Describe the operation of a three-phase inverter with 180Â° conduction mode.
10. Explain various methods of PWM voltage control in inverters.
11. Draw and explain the working of a pressurized lubrication system in automobiles.
12. Write about different measures to control automobile pollution.
13. Describe the chassis and body components of an automobile.
14. Explain the function of crankcase ventilation and the working of a positive crankcase ventilation system.
15. Compare different fuel injection systems used in CI engines.
16. Explain the construction and working of a Wankel engine with a neat diagram.
17. Describe various methods to improve engine performance in SI engines.
18. Explain the working of a multi-plate clutch with a neat diagram.
19. Draw a simplified wiring circuit for a car lighting system and explain its working.
20. Describe the function of a voltage regulator in a car electrical system.
21. Explain the construction of a disc-type wheel and its advantages.
22. Explain the Internet Protocol with a neat block diagram of the IP header format.
23. Draw neatly the TCP segment format and describe each of its fields.
24. Explain the real transport protocol of UDP and how to calculate checksum in UDP.
25. Explain the TCP connection establishment and termination process.
26. Distinguish between UDP and TCP with suitable examples.
27. Compare and contrast client/server with peer-to-peer data transfer over networks.
28. Trace out the steps involved when a user visits a URL for a browser to display web content.
29. Differentiate between SMTP and HTTP data transfer mechanisms.
30. Describe the role of the local name server and the authoritative name server in DNS.
31. What is the significance of protocol layering in networking?
32. Describe various types of transmission media and their applications.

33. Define Nyquistâ€™s theorem and Shannonâ€™s theorem.
34. Explain different types of guided and unguided media used in networking.
35. What are the advantages and disadvantages of using fiber optic cables in networking?
36. Discuss about pulse code modulation (PCM) and differential pulse code modulation (DPCM).
37. Explain in detail the modulation techniques used in data communication.
38. Define Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Modulation (PM).
39. Explain in detail about ASK, FSK, and PSK techniques.
40. What is Quadrature Amplitude Modulation (QAM)? How does it work?
41. Define and explain Line Coding. Compare different types of line coding techniques.
42. Explain the importance of Forward Error Correction (FEC) in data communication.
43. What are the salient features of broadcast radio receivers? Explain in detail.
44. Why are pre-emphasis and de-emphasis needed in FM but not in AM? Explain.
45. Explain in detail about the threshold effect in an Angle Modulation System.
46. Explain the generation of PAM with mathematical analysis.
47. Explain how PPM can be generated from PWM signals.
48. Explain how a superheterodyne receiver works.
49. Discuss the role of Automatic Gain Control (AGC) in AM receivers.
50. Compare different amplitude modulation techniques.
51. What is the principle of Amplitude Modulation? Derive the expression for the AM wave and draw its spectrum.
52. Explain the significance of Pre-emphasis and De-emphasis in FM transmission.
53. Derive an expression for transconductance of an n-channel enhancement MOSFET operating in the active region.
54. Derive ð¼ð‘‘I dð‘‰ð‘‘ð‘‘ V ds
55. relationship of MOS in the Resistive region.
56. Draw the VLSI design flow diagram and explain.
57. Explain 2Âµm CMOS design rules and discuss with layout examples.
58. Design a 2-input Ex-OR using CMOS Transmission gate.
59. Describe methods for driving large capacitive loads.
60. Describe Pseudo NMOS logic and Domino CMOS Logic.
61. Discuss the choice of fan-in and fan-out selection in gate-level design.
62. What is a current mirror? Explain the general properties of a current mirror with a block diagram.
63. Explain the operation of a single-stage amplifier with resistive load.
64. Explain how AM is supporting advances in exoskeleton technology.
65. What are the implications of AM on workforce skill development?
66. How does AM contribute to new breakthroughs in electronic miniaturization?

67. Explain the role of AM in the rapid testing of medical prototypes.
68. Discuss how AM is influencing the future of industrial robots.
69. What are the major security risks in digital AM design files?
70. Explain the advantages and disadvantages of hybrid AM processes.
71. Discuss the role of AM in the manufacturing of surgical instruments.
72. How does AM contribute to material property enhancement?
73. Explain how multi-material AM printers work.
74. What are the effects of layer thickness variation in AM?
75. Discuss the future of fully automated AM production systems.
76. How does AM improve reverse engineering capabilities?
77. Explain the effect of laser energy density in metal AM.
78. Discuss the limitations of polymer-based AM technologies.
79. What are the best practices for post-processing AM parts?
80. How does AM influence the design and production of electrical connectors?
81. Discuss the impact of high-resolution AM printing on medical imaging.
82. What are the effects of powder particle size in metal AM?
83. Explain the importance of surface finishing in AM.
84. Discuss the use of AM for structural health monitoring systems.
85. Define irrigation and explain its necessity and importance.
86. What is water logging? Discuss its causes and effects.
87. A certain crop is grown in an area of 3000 hectares, fed by a canal system. The field capacity of soil is 26%, optimum moisture is 12%, permanent wilting point is 10%, effective depth of the root zone is 80 cm, and the relative density of soil is 1.4. If the frequency of irrigation is 10 days and the overall efficiency is 23%, calculate:
88. (i) The daily consumptive use
89. (ii) The required water discharge in mÂ³/sec in the canal
90. Explain the advantages of canal lining and describe Kennedyâ€™s silt theory.
91. An impervious floor of a weir on permeable soil is 16m long with sheet piles at both ends. The upstream pile is 4m deep and the downstream pile is 5m deep. The weir creates a net head of 2.5m. Neglecting the thickness of the weir floor, calculate the uplift pressures at the junction of the inner faces of the pile with the weir floor using Khoslaâ€™s theory.
92. Describe the hydrologic cycle and explain human interventions affecting it.
93. A catchment has five rain gauge stations recording annual rainfall as 78.8 cm, 90.2 cm, 98.6 cm, 102.4 cm, and 70.4 cm. If a 6% error in mean rainfall estimation is acceptable, determine the additional number of gauges required.
94. What is a flow duration curve? What information can be gathered from it?
95. Explain the concept of unit hydrograph and describe its derivation.
96. Define land drainage. What are the benefits of drainage?

97. Explain the relationship between duty, delta, and base period in irrigation.
98. The discharge available from a tube-well is 120 mÂ³/hour. Assuming 3200 hours of operation in a year, estimate the culturable command area if the intensity of irrigation is 50% and the average depth of irrigation for Rabi and Kharif crops is 48 cm.
99. Explain different types of canals based on classification.
100. Describe the method of designing a canal using Laceyâ€™s regime theory.
101. Discuss the various types of weirs and their functions.
102. A weir across an alluvial river has a horizontal floor of length 60m and retains 6m of water under full pond condition. If the downstream sheet pile is driven to a depth of 6m below the average bed level, calculate the exit gradient.
103. Define hydrology and discuss its applications in civil engineering.
104. What is precipitation? Explain different types of precipitation.
105. Describe various methods of presenting rainfall data.
106. The ordinates (in mm) of a rainfall mass curve recorded at 15-minute intervals are: 0, 12.4, 22.1, 35.1, 63.7, 81.9, 109.2, 123.5, 132.6, 143.3, 146. Construct a hyetograph for uniform intervals of 15 minutes.
107. Explain the process of evaporation and the factors affecting it.
108. Discuss the factors influencing infiltration capacity.
109. What is runoff? List and explain the factors affecting runoff from a catchment.
110. Draw a flow-duration curve for a river based on the following discharge data (mÂ³/s) recorded in different class intervals: 20, 137, 183, 232, 169, 137, 121, 60, 30, 6.
111. Explain in detail the different methods of separating base flow from a hydrograph.
112. A flood hydrograph due to a six-hour storm has a peak of 470 mÂ³/sec. The average depth of rainfall is 8.0 cm. Assuming an infiltration loss of 0.25 cm/hour and a constant base flow of 15 mÂ³/sec, estimate the peak discharge of the 6-hour unit hydrograph for this catchment.
113. What are the limitations and applications of the unit hydrograph?
114. Differentiate between hyetograph and hydrograph with appropriate illustrations.
115. Explain the concept of an instantaneous unit hydrograph (IUH) and its characteristics.