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**DEPARTMENT OF PHYSICS**

**III B.Sc., PHYSICS : ANALOG ELECTRONICS**

**RCCSPH7**

**2 Marks**

1. Distinguish between conductors, semiconductors and insulators
2. What is semiconductor? What are its types? Give the examples of semiconductors
3. What are the properties of Semiconductors
4. Define crystals
5. What do you mean by intrinsic and extrinsic semiconductor.
6. What is doping? Give two examples for trivalent and pentavalent impurity
7. What is meant by n- type & p-type semiconductor
8. Define pn junction
9. What is barrier potential
10. What is meant by biasing a diode
11. Define Forward and Reverse bias
12. What is breakdown voltage
13. What is knee voltage
14. What is peak inverse voltage
15. Define maximum power rating
16. Define crystal diode
17. Define forward and reverse resistance
18. Define forward and reverse current
19. What is rectifier
20. What are the disadvantages of half-wave rectifier
21. Define rectifier efficiency
22. What are the advantages and disadvantages of Full wave rectifier
23. Define zener diode
24. What is zener voltage and zener current
25. Draw the characteristics of a diode and label the different regions.
26. Write a note on break down mechanism
27. What is meant by a transistor
28. Define emitter, base & collector
29. What is meant by emitter diode and collector diode
30. What are the two basic transistor types?
31. What do you meant by BJT
32. Draw the symbol of NPN & PNP transistor and specify the loads.
33. Name the three possible transistor connections.
34. Define α. Show that it always less than unity.
35. Obtain the relationship between α and β of a transistor
36. Define input resistance
37. Define output resistance
38. What is base current amplification factor.
39. Define γ
40. What do you mean by zero signal collector current
41. Given the α of a transistor as 0.96; calculate the value of β.
42. Calculate IE in a transistor for which β=50 and IB = 20μA
43. Define dc load line
44. What is meant by Q-point
45. Define faithful amplification
46. What are the basic conditions of faithful amplification
47. What is transistor biasing
48. Define stabilization
49. What is the need for stabilization in transistor circuits.
50. What do you meant by thermal runaway
51. Mention the essentials of a biasing circuits
52. Define stability factor
53. What are the methods of transistor biasing
54. Define single stage transistor amplifier
55. Define phase reversal
56. What is power stage
57. What is known as transistor audio power amplifier
58. Define small signal & large signal amplifiers
59. What are the desirable properties of a power amplifier
60. What is a Class-A amplifier
61. What is Class – B & Class –C amplifier
62. Mention the merits of push-pull amplifier
63. What is meant by feedback? Mention the types of it
64. Define the feed back principle
65. What is negative & positive feedback
66. Define open-loop & closed- loop gain
67. What are the properties of negative feedback
68. Define oscillation and sinusoidal oscillator
69. Write any two advantages of oscillators
70. Define damped & undamped oscillations
71. State the Barkhasaun criterion for oscillation
72. What is meant by tank circuit
73. Mention the condition for oscillation
74. What are the advantages of a FET over BJT?
75. Define n-channel & p-channel JFET
76. Define unipolar & bipolartransistor
77. What are the salient features of JFET
78. Derive the relation among JFET parameter
79. What is the function of phototransistor
80. Mention the uses of phototransistor.
81. Define transconductance and amplification factor of a FET
82. How does a MOSFET differ from a JFET
83. What is MOSFET? Draw its symbol
84. What is SCR? Draw its Symbol
85. Give two applications of SCR
86. What is a UJT? Give its symbol
87. What are the characteristics and uses of the UJT
88. Give important applications of UJT
89. What are the characteristics and uses of the UJT
90. Give the principle of phototransistor
91. List the characteristics of an ideal OP-AMP
92. What is a differential amplifier
93. State the applications of operational amplifier
94. Define CMRR
95. What is meant by virtual ground
96. What are the four important applications of an Op-Amp
97. What is the important difference between an inverting and non-inverting amplifier
98. Calculate CMRR of an op-amp, which has the differential gain of 200000 and the common-mode gain of 6.33
99. Slew rate of an op-amp
100. What is common-mode & Differential mode signals.
101. What is a voltage follower.

**5 Marks**

1. Which are the most commonly used semiconductors and why?
2. How n type semiconductors are formed
3. How p type semiconductors are formed
4. Write a short note on pn junction
5. Explain the formation of potential barrier in a pn junction
6. Draw and explain the V-I characteristics of a pn junction
7. What is crystal diode? Explain its rectifying action
8. Describe a half-wave rectifier using a crystal diode
9. Derive an expression for the efficiency of a half-wave rectifier
10. What is zener effect? Discuss the working and characteristics of zener diode
11. Discuss the action of a Centre-Tap full wave rectifier
12. Explain the action of full wave rectifier
13. Describe an experiment to determine the static characteristic of a transistor in CE mode
14. Explain fixed bias in transistor
15. With a neat diagram, explain the different modes of operation of transistor. Also explain α and β
16. Explain the two port representation of a transistor also discuss its advantages
17. What is meant by dc load line? Explain how this line is constructed?
18. Define α and β of a transistor. Establi sh the relation between them.
19. Discuss the voltage divider biasing of a transistor with a neat circuit diagram
20. Explain the operation of NPN transistor
21. Draw diagrams indicating the biasing arrangements in pnp and npn transistors working in active region and explain
22. The collector current of a transistor is 6.5mA and the current gain α = 0.96. calculate base current and β
23. Draw the equivalent circuit of a common emitter amplifier in terms of h-parameter and obtain the expression for voltage gain
24. Describe how the dc biasing is used to stabilize a transistor.
25. Derive the relation between γ and α in common collector connection.
26. Describe how a transistor can be operated as an amplifier
27. An amplifier has a gain of 300 when negative feedback is applied the gain is reduced to 240. Find the feedback ratio
28. Obtain an expression for the efficiency of a transformer coupled class A power amplifier.
29. Describe the principle of negative feedback in amplifiers with neat diagram
30. Explain the effect of negative feedback on the stability of gain of an amplifier
31. Explain Emitter follower
32. How amplifiers have been classified? Discuss the salient features of the Class A and Class B amplifiers.
33. What are power amplifiers? Obtain an expression for the overall efficiency of Class B amplifier
34. Describe the working of single stage CE amplifier
35. Show that the overall efficiency of a Class B power amplifier is 78.5%
36. Compare transistor and FET
37. Describe the working of a relaxation oscillator circuit using UJT
38. Explain the construction and working of a SCR. Discuss its applications
39. Explain the constructional and operational details of JFET.
40. Define the FET parameters and obtain the relation between them.
41. Describe the construction and working of UJT. Explain the negative region of its characteristics.
42. Give the theory of operation of JFET. Draw its characteristics curve and explain its various regions
43. Describe the construction and working of a phototransistor.
44. Describe the V-I characteristic of SCR.
45. Discuss the function of SCR as a switch.
46. How OP-AMP parameters are measured
47. Explain the basic circuit of Differential Amplifier.
48. What are the characteristics of an ideal op-amp
49. Explain the inverting and non-inverting OPAMP using proper circuit diagram
50. Obtain an expression for the voltage gain of an inverting operational amplifier
51. Draw the circuit of an summing amplifier and derive the expression for an output voltage
52. Explain the Frequency Response with a neat diagram of an OP AMP
53. With neat circuit diagram, explain the action of differential amplifier using operational amplifier.
54. Explain how an op-amp acts as an integrator
55. Discuss the operation of Op-amp differentiator

**10 Marks**

1. Explain intrinsic and extrinsic semiconductors briefly.
2. Explain the working of a pn junction. Discuss forward and reverse biasing of pn junction diode with diagrams. What is meant by avalanche break down
3. Describe a full wave rectifier and derive an expression for the efficiency of a full wave rectifier
4. Discuss the avalanche and zener breakdown of a diode. What is a zener diode? Discuss the V-I characteristics of it
5. What is a zener diode? Explain how a zener diode can be used as a voltage regulator.
6. Briefly explain the working of a transistor
7. Explain CB Connection and also explain how the input and output characteristics of a common base transistor can be obtained with a neat circuit diagram.
8. What is the need for biasing a transistor. Explain any two types of biasing methods, with neat circuit diagrams.
9. Discuss the action of a transistor as a two port network.
10. With a neat circuit diagram explain the working of a transistor amplifier
11. Describe about ‘h’ parameters
12. Using h- parameters, obtain expression for voltage gain, current gain, power gain, input and output impedance of a CE transistor amplifier
13. Using a neat circuit diagram, explain the action of a push-pull amplifier, Explain its advantages
14. Draw a neat circuit diagram for Colpitts oscillator and explain its working. Derive an expression for its frequency.
15. Explain the action of a Hartley oscillator and hence obtain an expression for its frequency of oscillation
16. Explain the action of MOSFET and Phototransistor
17. What is a FET? Describe its parameters
18. Describe the structure and explain the working of a n-channel JFET. Draw its characteristics curves and mark the features
19. Explain with suitable diagrams, the construction and operation of MOSFET.
20. Describe the construction and working of a UJT, explaining the negative region of its characteristics
21. Describe the construction, working and characteristics of SCR
22. Compare a FET with a BJT
23. Give two applications of SCR
24. Explain the operation of the differential amplifier.
25. Explain in detail about any three measurements of an operational amplifier parameters.
26. Describe how an op-amp is used as an adder and subtractor
27. Explain how an Op-amp act as a differentiator and an integrator. Obtain an expression for its output voltage
28. Explain how does the op-amp work as an inverting and non-inverting amplifier with neat circuit diagrams.