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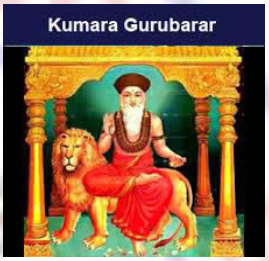

QUESTION BANK

Title of the Paper

ELECTRONICS

Course: III B.Sc. (Physics)

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CORE COURSE VII

ELECTRONICS

UNIT I Semiconductors, diodes and Bipolar Transistors

Intrinsic and extrinsic semi -conductors –PN junction diode – Biasing–V-I Characteristics– Rectifiers – Half wave – full wave and Bridge rectifiers – Break down mechanisms – Zener diode- characteristics of Zener diode – Zener diode as voltage regulator-Bipolar junction transistor – Basic configurations -Relation between α and β – Characteristic curves of transistor – CB, CE mode – DC load line – DC bias and stabilization – fixed bias – voltage divider bias.

UNIT II Amplifiers and Oscillators

Single stage CE amplifier – Analysis of hybrid equivalent circuit – Power amplifiers – Efficiency of class A,B& C Power amplifier - General theory of feedback – Properties of negative feedback – Criterion for oscillations – Hartley oscillator – Colpitt's oscillator.

UNIT III Number Systems, Logic Gates and Boolean Algebra

Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions– 1's and 2's complements –Logic gates, Symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates. Boolean algebra – De-Morgan's theorems -Reducing Boolean expressions using Boolean laws – SOP forms of expressions (minterms) – Karnaugh map simplification(Four variables).

UNIT IV Combinational and Sequential Digital Systems

Half and full adders – Half and full subtractors – Decoder(2:4 line) – Encoder (4:2 line)– Multiplexer(4:1 line) – Demultiplexer (1:4 line) - Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Mod-10 counter –– Synchronous counter – Ring counter - Shift registers – SISO and SIPO shift registers.

UNIT V Operational amplifier

Operational amplifier - Characteristics – Inverting and Non-inverting amplifier – Voltage follower – Adder, Subtractor, Integrator and Differentiator circuits – Log & antilog amplifiers – Op- amp as Comparator – Filters-low, bandpass, high pass filters -A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

III – B.Sc (PHYSICS)

ELECTRONICS

UNIT-I

Choose the correct answer:

1. Intrinsic semiconductor is----------
   A) Pure semiconductor
   B) Impure semiconductor
   C) Semiconductor
   D) None of above
2. Current conduction of intrinsic semiconductor is----
   A) More current conduction
   B) Little current conduction
   C) Very high
   D) Not conduct
3. Extrinsic semiconductor means
   A) Pure semiconductor
   B) Impure semiconductor
   C) Type of semiconductor
   D) None of these
4. Current conduction of extrinsic semiconductor is
   A) Partially current conduction
   B) Little current conduction
   C) Not current conduction
   D) More current conduction

5. Rectification is a process in which----- is convert into-----
   A) D.C. into A.C
   B) A .C. into D.C
   C) A.C. into A.C
   D) D.C. into D.C
6. Half wave output is
   A) Unidirectional
   B) Bidirectional
   C) Output is zero
   D) None of these
7. How many diodes are used in Centre tapped full wave rectifier
   A) 4-diode
   B) 1-diode
   C) 2-diode
   D) None of these
8. The forward bias means
   A) Current flow due to majority carriers
   B) Current flow due to minority carriers
   C) Majority +ve charge
   D) Minority -ve charge
9. Transistor is ____ device.
   A) Semiconductor electronic device
   B) Electric device
   C) Metal
   D) None of above
10. β Is a
   A) Current amplification factor
   B) Voltage amplification
   C) Base current
   D) Base voltage

ANSWERS:

1. A 2. B 3.B 4.D 5.A 6.A 7.C 8.A 9.C 10.A

TWO MARKS

11. Define the Intrinsic semiconductor.
12. Define the Extrinsic semiconductor.
13. State that PN-junction diode.
14. What is rectifier?
15. State that zener diode.

16. Define zener diode as a voltage regulator.
17. State that bipolar junction transistor.
18. Write the current amplification (β) value.
19. Give the meaning of (α).
20. What is voltage divider?

FIVE-MARKS

21. Write the short notes of intrinsic semiconductor.
22. Write characteristics of PN-junction diode.
23. What is mean by rectifier and give the working?
24. Write the working of half wave rectifier.
25. Write the working of full wave rectifier.
26. Write the working of bridge rectifier.
27. Explain zener diode as a voltage regulator.
28. Write characteristics of zener diode.
29. Explain basic concept of transistor.
30. Working of DC load line.

TEN MARKS

31. Explain types of semiconductor and it's working.
32. Briefly explain V-I characteristics of zener diode and semi conductordiode.
33. Explain types of rectifiers.
34. Explain types of full wave rectifiers.
35. Discuss the DC bias and it's working.
36. Explain the characteristics of Transistor CE and CB mode.
37. Discuss the relation between $\alpha \; and \; \beta$.
38. Explain the basic configuration of Transistor.
39. Explain basic concept of Transistor and its working.
40. Explain the configuration of Transistor CE and CB mode.

UNIT- II

Choose the correct answer:

1. CE means---
   A) Common emitter
   B) B)Common base
   C) Common collector
   D) none of these
2. h-Parameter is a
   A) Electric signal
   B) Hybrid equivalent circuit
   C) Electric current
   D) Electric voltage
3. Class C power amplifier
   A) Collector current flow for less than half cycle of the I/P signal
   B) Collector current flows only during the +ve half cycle of the I/P signal
   C) Collector current flows at all times during the full cycle of the signal
   D) None of above
4. Class A power amplifier
   A) Collector current flow for less than half cycle of the I/P signal
   B) Collector current flows only during the +ve half cycle of the I/P signal
   C) Collector current flows at all times during the full cycle of the signal
   D) None of above
5. Transistor amplifier is
   A) D.C. into A.C
   B) A .C. into D.C
   C) A.C. into A.C
   D) D.C. into D.C
6. A_vMeans
   A) Feedback fraction
   B) Voltage gain amplifier
   C) Input amplifier
   D) Negative feedback
7. M_v Means
   A) Feedback fraction
   B) Voltage gain amplifier
   C) Input amplifier
   D) Negative feedback

8. The value of M_v is
   A) $\frac{V_f}{V_{out}}$
   B) $\frac{V_f}{V_{in}}$
   C) $\frac{V_f}{V_f}$
   D) $\frac{V_{out}}{V_f}$
9. The value of C_T is
   A) $\frac{c_1c_2}{c_1+c_2}$
   B) $\frac{c_1+c_2}{c_1+c_2}$
   C) $\frac{c_1+c_2}{c_1c_2}$
   D) $\frac{c_1c_2}{c_1c_2}$
10. The frequency value of Colpitt's oscillator is
   A) $f = \frac{1}{2\pi\sqrt{RC}}$
   B) $f = \frac{1}{2\pi RC\sqrt{6}}$
   C) $f = \frac{1}{4\pi LC}$
   D) $f = \frac{1}{2\pi\sqrt{LC_T}}$

ANSWERS:

1.(A) 2.(B) 3.(A) 4.(C) 5.(A) 6.(B) 7.(A) 8(A) 9.(A) 10.(D)

TWO MARKS

11. What is amplifier?
12. What is mean by single stage CE amplifier?
13. Draw the hybrid equivalent circuit.
14. What is power amplifier?
15. What is mean by A, B,C class?
16. Write the term of feedback.
17. Define TANK circuit.
18. Define types of feedback.
19. What is oscillator?
20. Define short notes of Hartley and Colpitt's oscillator.

FIVE MARKS

21. Write working of single stage CE amplifier.
22. Explain analysis of Hybrid equivalent circuit.

23. Explain efficiency of “class A” amplifier.
24. Explain efficiency of “class C” amplifier.
25. Explain efficiency of “class B” amplifier.
26. Discuss the general theory of feedback.
27. Write the properties of negative feedback.
28. Define types of oscillator.
29. Explain: Working of oscillator.
30. Give the notes of Essential circuit of Oscillator.

TEN MARKS

31. Explain about working of Hartley Oscillator.
32. Write about working of colpit’s oscillator and write its frequency.
33. Detailed explain negative feedback.
34. Explain the basic concept of feedback and its types.
35. Explain efficiency of class A, B, C power amplifier.
36. What is mean by power amplifier?And write how it’s working.
37. Explain: H-parameters.
38. Explain the working of amplifier.
39. Explain the positive feedback.
40. Discuss Criterion for oscillator.

UNIT-III

Choose the correct answer:

1. The binary equivalent of the octal number 23 is
   A) $(010010)_2$
   B) $(010010)_2$
   C) $(010010)_2$
   D) $(010010)_2$
2. Which one of the following is not a Hexa decimal digit?
   A) A
   B) F
   C) E
   D) G
3. The logic gate which produces zero output for the input 00 and 11 is
   A) OR
   B) AND
   C) EX-OR
   D) EX-NOR

4. The Boolean equation A+$\overline{A}$B is equal to
   A) A+B
   B) A-B
   C) A+AB
   D) AA+A$\overline{B}$
5. The Boolean expression for NOR function is
   A) $Y = \overline{A + B}$
   B) Y=A+B
   C) Y=A-B
   D) Y=A+$\overline{ABC}$
6. The commutative law is
   A) A+B=B+A
   B) A+A=A
   C) A(A+B)=A
   D) A.1=A
7. The binary equivalent of 25_{10} is
   A) $(11010)_2$
   B) $(10111)_2$
   C)$(11101)_2$
   D) $(11001)_2$
8. The gate with one input and one output is
   A) AND
   B) OR
   C) NOT
   D) EX-NOR
9. The De-Morgan's theorem$\overline{A + B}$ is equal to
   A) $\overline{A.B}$
   B) $\overline{A}\,.\overline{B}$
   C) $\overline{A} + \overline{B}$
   D) $\overline{A + B}$
10. Which isOR gate expression?
   A) A+B
   B) A.B
   C) $\overline{A + B}$
   D) $\overline{A} + \overline{B}$

ANSWERS:

1)C 2) D 3) C 4) A 5) A 6) A 7) D 8)C 9)B 10)A

TWO MARKS

11. $(1010)_2$ = $(?)_{10}$

12. $(25)_{10}$ = $(?)_2$

13. $(3574)_8$ into Binary.

14. 1.10 from 10.10 using 1's complement.

15. Given the answer EX-OR truth table.

16. Write about the three basic Boolean algebra?

17. Find the complement of$\overline{X}.\overline{Y}$ + X.$\overline{Y}$

18. Reducing Boolean expression is ABC+A$\overline{B}$C+AB$\overline{C}$

19. Simplify the $(A+B)\ (\overline{B}+C)\ (\overline{A}+C)$b to sum of products form.

20. Draw the TWO variables K-Map.

FIVE MARKS

21. 111.10 from 11O1.10 using 1's and 2's complement.

22.i) $(F2E)_{16}$ =$(?)_{10}$ ii)$(ABC)_{16}$ = $(?)_{10}$

23. Design the Discrete components of basic gates.

24. Write answer for list of the law and theorem of Boolean algebra.

25. Discuss about the De-Morgan's theorem.

26. Proof that (A+B) ($\overline{A}$+C) = AC+$\overline{A}\ B$.

27. Develop SOP expressions from three signal NAND gates truth table.

28. Draw the logic diagram for the simplified SOP expression.

A	B	C	Z
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

29. Simplify the Boolean function F(x, y, z) = $\sum(3,4.6,7)$ using k-map.

30. Find out thesum of Minterm from Boolean function F=($\overline{A}$C+$\overline{A}$B+A$\overline{B}$C+BC).

TEN MARKS

31. Simplify the Boolean function F (A, B, C, D) =$\sum(0,1,2,4,5,6,8,9,12,13,14)$ using K-map.

32. Simplify the following Boolean function into sum of products form (SOP) F (A, B, C, D) =$\sum(0,1,2,5,8,9,10)$.

33. Explain “NAND” and “NOR” as a universal gate.

34. Draw the symbols and truth table condition of logic gates.

35. Detailed explain number system. (Decimal, octal and hexadecimal)

36.i) $(1272)_{10} = (?)_{16}$ ii) $(0.46276)_{10} = (?)_{16}$

37. Prepare the truth table for each if the following expression

i) $XYZ + \bar{X}\bar{Y}Z$

ii) ABC+A$\bar{B}\bar{C}$ + $\bar{A}\bar{B}\bar{C}$

iii) $X\bar{Y}\ (Z + Y\bar{Z}) + \bar{Z}$

38. Simplify the Boolean function $F(\mathrm{X},\mathrm{Y},\mathrm{Z}) = \sum(3,6,7)$ and F(X,Y,Z) = $\sum(3,4,6,7)$ and F(A,B,C)=(0,2,4,5,6)

39. Simplify the following Boolean expressions using four variable maps:

i) $\overline{ABD} + \overline{BCD}$ +BCD+AC$\overline{D}$+$\overline{AB}$C+$\overline{A}B\overline{C}D$

ii) $\overline{w}z$+xz+$\overline{x}\ y$+w$\overline{x}$

40. Reduce this expression y= (A+B) $(A+\overline{B})$ $(\overline{A}+B)$ by using Boolean laws.

UNIT – IV

Choose the correct answer:

1. In half adder sum can be obtained using the logic gate.
   A) OR
   B) EX-OR
   C) EX-NOR
   D) AND
2. In the case of full adder the carry to (n+1) Th bit is given by

   A) $C_n = B_nA_n + A_n B_n C_{n+1} + C_{n-1}A_n$

   B)$C_n = A_n B_n + A_n C_{n-1} + B_nC_{n-1}$

   C)$C_n = A_n B_n + A_n C_{n-1}$

   D) $C_n = A_n C_{n-1} + B_n C_{n-1}$
3. The flip flop which produces unpredictable output for the input 1,1 is
   A) R-S flip flop
   B) J, K flip flop
   C) M-S flip flop
   D) D flip flop
4. The flip flop which eliminates the race condition is
   A) R-S flip flop
   B) J, K flip flop
   C) M-S flip flop
   D) T- flip flop
5. In Master slave flip flop if the output of master is 1, then the output of slave is
   A) 1
   B) 0
   C) 2
   D) $\overline{1}$
6. The minimum no of flip flops required to constructed Mod-10 counter is
   A) 2
   B) 3
   C) 4
   D) 5

7. The modulus of a BCD counter is
    A) 9
    B) 10
    C) 8
    D) 16
8. Flip flop is a ----- circuit
    A) Sequential circuits
    B) Combinational circuit
    C) Moore circuit
    D) mealy circuit
9. Encoders is a ------ circuit
    A) Sequential circuits
    B) Combinational circuit
    C) Moore circuit
    D) mealy circuit
10. Multiplex means
    A) Many input into one output
    B) One input into many output
    C) One input into one output
    D) One input into zero output

ANSWER:

1. (C) 2. (B) 3.(A) 4 .(D) 5.(A) 6.(A) 7.(B) 8. (A) 9.(B)10.(A)

TWO MARKS

11. Draw the Half adder circuit diagram.

12. Define Half adder.

13. Define full adder.

14. Draw the full adder truth table.

15. Define full subtractor.

16What are the combinational circuit?

17. What is sequential circuit?

18. Define multiplexer and D-multiplexer.

19. State that Counter.

20. Define SISO and SIPO shifter registers.

FIVE MARKS

21. Explain combinational circuit and its types.

22. Write short notes of sequential circuit.

23. Discuss the comparison between the sequential circuit and combinational circuit.

24. Explain half adder and determine the output variable by using k-map.

25. Explain half subtractorand determine the output variable by using k-map

26. Define 2:4 linedecoders.

27. Write 4:2 lines Encoder and draw the circuit diagram.

28. Write short notes for shift registers.

29. Write short notes for SISO register.

30. Explain synchronous counter.

TEN MARKS

31. Briefly explain combinational circuit such as half adder & subtractorand

Full adder &full subtractor.

32. Explain full adder and full subtractor and determine the output variable by using k-map

33. Explain: sequential circuits.

34. Explain: multiplexer 4-1 lines.

35. Briefly Explain: Demultiflexer 1-4 lines.

36. Write explanation of types of flip flops.

37. Explain 4-bilt Asynchronous counter.

38. Briefly explain M-S flip flop.

39. Explain Mod-10 counter.

40. Detailed explain for Counters.

UNIT -V

Choose the correct answer:

1. Op-amp has------- input terminal
   A) 1
   B) 2
   C) 3
   D) 4
2. When an op-amp is used as a buffer, the gain of the op-amp is
   A) 0
   B) infinity
   C) 1
   D) any value between 0 & ∞
3. The op-amp IC741 is made to work with a power supply of
   A) -15_V and $+15_V$
   B) 0_V and $+5_V$
   C) 0_V and -5_V
   D) -20_V and $+20_V$
4. Gain of Inverting Amplifier is
   A) $-\frac{R_f}{R_1}$
   B) $\frac{R_f}{R_1}$
   C) $-\frac{R_f}{R_1}$
   D) $-\frac{R_f}{R_{0\,M}}$
5. The CMRR is given A_d differential gain AC-common mode gain
   A) $\rho = \frac{A_d}{A_c}$
   B) $\rho = \frac{A_c}{A_d}$
   C) $\rho = A_c \,.\, A_d$
   D) $\rho = \frac{A_d}{A_c}$
6. To reduce the noise in the output of an op-amp it should be used as
   A) Common mode Amplifier
   B) Differential Amplifier.
   C) Noise cannot be reduced in both the modes
   D) Noise Increases in the differential modes

7. The input of an op-amp integrator is a square wave, and then the output wave form is
    A) Sine Wave
    B) cosine wave
    C) Triangle wave
    D) Saw tooth wave
8. Successive approximation method is ____conversion
    A) $^{A}/_{D}$ Conversion
    B) $^{D}/_{A}$Conversion
    C) $^{A}/_{A}$Conversion
    D) $^{D}/_{D}$Conversion
9. R-2R ladder network method ____ conversion
    A) $^{A}/_{D}$ Conversion
    B) $^{D}/_{A}$ Conversion
    C) $^{A}/_{A}$ Conversion
    D) $^{D}/_{D}$ Conversion
10. The ideal op-amp Gain is_____
    A) ∞
    B) 0
    C) low
    D) high

ANSWERS:

1.(B) 2.(C) 3.(A) 4.(A) 5.(A) 6.(B) 7.(C) 8.(A) 9.(B) 10.(A)

TWO MARKS

11. Write the answer stands for op-amp.
12. Define operational amplifier.
13. Write any two characteristics of op-amp.
14. Write the answer operation of op-amp.
15. Define inverting and non-inverting.
16. Define log and Antilog amplifier.
17. State that gain of op-amp and its types.
18. Define feedback circuit.
19. State that conversion and its types.
20. Define R-2R ladder network.

FIVE MARKS

21. Explain the basic concept of op-amp.
22. Write notes of characteristics of ideal op-amp.
23. Write notes of voltage follower.
24. Discuss the applications of op-amp like Adder.
25. Discuss the Subtractor.
26. Explain Filters-low band pass.
27. Discuss the working of D/A conversion.
28. Discuss the performance (working) of R-2R ladder networks.
29. Explain the high pass filter.
30. Explain the virtual ground.

TENMARKS

31. Briefly explain inverting and non-inverting amplifier.
32. Derive the application of op-amp from D.C voltage circuit diagram.
33. Write notes of op-amp characters, symbols, applications and its gain.
34. Briefly explain Log and Antilog amplifier.
35. Detailed explain Filters and its types.
36. Briefly explain conversions and its types.
37. Explain the successive approximation methods.
38. Explain the open loop and closed loop gain.
39. Explain and derive the op-amp as comparators.
40. i) Find out the following question from inverting amplifier circuits.
    Input voltage (V) = 5_v andresistance (R_1) =100k,(R_2)=50k,(R3)=200k,and (R_f)=100k.Find out output voltage and voltage gain (V_o and A_v).

ii) Find out the following question from non-inverting amplifier circuits.
V_{in} =5_v,R_{in} = 200k and R_f =200k. V_o =?