

Total No. of Questions : 40]

Code No. **40**

Total No. of Printed Pages : 7]

June/July, 2011

ELECTRONICS

Time : 3 Hours 15 Minutes]

[Max. Marks : 90

Note : i) The question paper has *four* **Parts A, B, C & D**.

ii) Question No. **23** in **Part C** and Question No. **32** in **Part D** are from practicals.

iii) Read the instructions given for each Part.

PART - A

Note : Answer *all* questions.

10 × 1 = 10

1. Draw the symbol of a PNP transistor.
2. Calculate the voltage gain of an amplifier if a 10mV input generates 1V output.
3. Write the expression for voltage gain with positive feedback.
4. Define Slew rate.
5. Between LC and RC oscillators, which is preferred for generating high frequencies ?
6. What is an Antenna ?
7. How many sidebands are present in AM wave ?

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8. Mention any one universal gate.
9. What is a pair in K -map ?
10. Expand LAN.

PART - B

Note : Answer any ten questions.

$10 \times 2 = 20$

11. What are the advantages of a transistor over a triode vacuum tube ?
12. Draw the frequency response of a CE Amplifier. Mention 3 dB line.
13. An amplifier has bandwidth of 100 kHz and voltage gain of 50. What will be the new bandwidth and gain if 2% negative feedback is introduced ?
14. Write any four characteristics of an ideal Op-Amp.
15. Write the differences between an Amplifier and an Oscillator.
16. Define :
 - a) Skip distance
 - b) Skip zone.
17. The amplitude of carrier wave is 10 V and modulation index is 0.8. Calculate the amplitude of sidebands.
18. What are the limitations of AM ?
19. Convert the given expression $Y = A + \bar{B}$ into canonical SOP form.
20. Using XOR gates convert $1011_{(G)}$ to binary.
21. What are combinational and sequential logic circuits ?
22. Mention few uses of computer networks.

PART - C

I. Answer the following question : 1 × 4 = 4

23. Using the following data, calculate the theoretical and experimental values of frequency of Wein-Bridge Oscillator :

S.No.	R (Ω)	C (μF)	T (ms)	Frequency	
				Theoretical	Experimental
1	330	0.1	0.2		
2	470	0.1	0.3		

$$(R_1 = R_2 = R; C_1 = C_2 = C).$$

OR

Using the following data, calculate the experimental and theoretical values of voltage gain for an inverting Op-Amp.

$$V_{in} = 1 \text{ V}$$

S.No.	R_1 in ($k\Omega$)	R_f in ($k\Omega$)	V_o in volts	Voltage gain	
				Theoretical	Experimental
1	4.7	12	-2.6		
2	6.8	15	-2.3		

II. Answer any *five* questions : 5 × 4 = 20

24. Draw the output characteristics of transistor in CE mode. Write the biasing conditions in different operating regions.

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25. In a single stage CE Amplifier $R_1 = 50 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$, $R_C = 3.3 \text{ k}\Omega$, $R_E = 1 \text{ k}\Omega$, $R_L = 2 \text{ k}\Omega$, $V_{CC} = 10 \text{ V}$ and $\beta = 100$. Given $r_e' = \frac{26 \text{ mV}}{I_E}$, $V_{BE} = 0.7 \text{ V}$. Calculate r_{in} , r_o , A_v and A_p .
26. Derive an expression for the input impedance of a voltage series negative feedback amplifier.
27. What is a differentiator ? Derive an expression for the output voltage.
28. Design an inverting adder using Op-Amp, whose output expression is $V_o = -(4V_1 + 3V_2 - 10V_3)$, where $R_f = 100 \text{ k}\Omega$.
29. What is a tank circuit ? Explain how oscillations are produced.
30. An FM wave is given by $V = 20 \sin(4 \times 10^8 t + 5 \sin 2000 t)$.

Calculate :

- i) Carrier frequency
- ii) Modulating frequency
- iii) Modulation index
- iv) Frequency deviation.

31. Explain the function of each block of digital computer with a neat block diagram.

PART - D

- I. Answer the following question : 6

32. Describe an experiment to study the frequency response curve of a transistor CC-amplifier.

OR

Describe an experiment to study Op-Amp subtractor. Draw the pin diagram of IC 741.

- II. Answer any *five* questions : 5 × 6 = 30

33. a) Explain the working of CE amplifier. 4

- b) The voltage across collector resistance $R_C = 2.2 \text{ k}\Omega$ is 6V.

Calculate the value of I_B and I_C if $\beta = 100$. 2

34. a) Explain the working of direct coupled amplifier and draw the frequency response curve. 4

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- b) Differentiate between single stage CE amplifier and multistage amplifier. 2
35. a) With a neat circuit diagram, explain the working of an RC Phase-shift oscillator. Write the expression for the frequency of oscillation. 4
- b) What is a difference amplifier? Write its output voltage expression. 2
36. a) Draw the block diagram of AM transmitter and explain briefly. 4
- b) Using Op-Amp draw the buffer circuit. 2
37. a) Distinguish between AM and FM. 4
- b) Give the equivalent circuit of a quartz crystal. 2
38. a) Explain the working of RS flip-flop using NAND gates. Write its truth table. 4
- b) Write the logic symbol and truth table of NOR gate. 2

39. a) Using *K*-map simplify the expression

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 6, 10, 14)$$

Draw the logic circuit for the simplified expression using basic gates. 4

b) Convert 25.7_{10} into BCD. 2

40. a) Draw the block diagram of a TV receiver. 4

b) What are (i) transponder and (ii) uplink signal? 2
