

Code No. **40-NS**

Total No. of Questions : 40]

[Total No. of Printed Pages : 4

July, 2007
ELECTRONICS
(New Syllabus)

Time : 3 Hours]

[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. Define β of a transistor.
2. Which transistor amplifier has a current gain less than unity ?
3. What is open loop gain ?
4. What is the bandwidth of an ideal Op-Amp ?
5. What are sinusoidal oscillators ?
6. Define signal to noise ratio.
7. How many sidebands are present in FM wave ?
8. Write the Boolean expression for two input XNOR gate.
9. Convert $(100001)_2$ to gray code.
10. Expand MAN.

PART - B

Note : Answer any ten questions.

10 × 2 = 20

11. Determine I_C , when $I_E = 9.35$ mA and $\alpha = 0.96$.
12. Define lower cut-off frequency and bandwidth of an amplifier.
13. Mention any two types of amplifiers based on coupling.
14. Draw the block diagrams of voltage-series and current-series feedback amplifiers.

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15. What is an Op-Amp Integrator ? Sketch the o/p waveform for a square wave i/p.
16. What is the voltage gain of a negative feedback amplifier when voltage gain without feedback is 10,000 and $\beta = 1$?
17. Draw the labelled block diagram of a communication system.
18. Define the terms sensitivity and selectivity.
19. When the modulating signal frequency in FM is 600 Hz and modulation index is 60, then calculate maximum deviation.
20. Distinguish between SOP and POS forms.
21. What is a half-adder ? Write its logic circuit using XOR and AND gates.
22. Write a note on satellite communication.

PART - C

I. Answer the following question :

$1 \times 4 = 4$

23. Using the following data, calculate experimental and theoretical frequency of oscillations in Wien-bridge oscillator.

Sl. No.	R in $k\Omega$	C in μF	Time period
1	2.2	0.01	0.14 msec
2	4.7	0.01	0.3 msec

OR

Using the following data, calculate experimental and theoretical values of voltage gain for non-inverting amplifier. Given $R_f = 10 k\Omega$

and

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

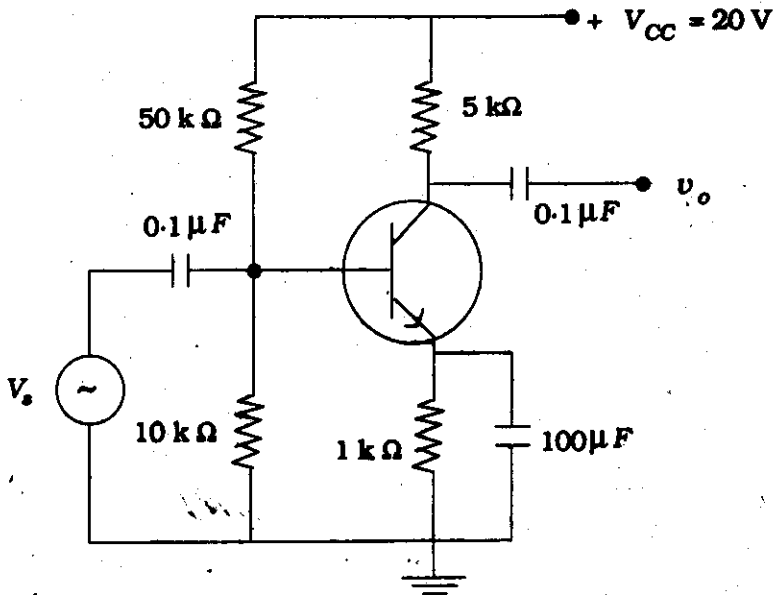
Sl. No.	R_i in $k\Omega$	V_o in volts
1	2	5.8
2	4	3.6

II. Answer any five questions.

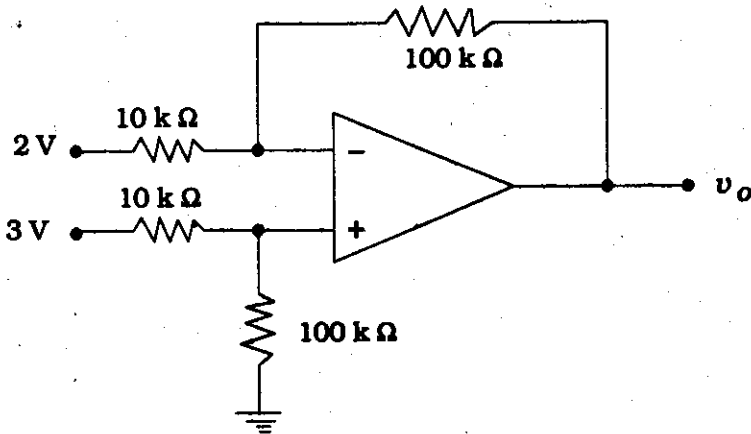
$5 \times 4 = 20$

24. Explain with a circuit diagram, the working of a CE transistor amplifier.

25. For the network shown below, determine I_E , r_e and A_v . Take $V_{BE} = 0.3 \text{ V}$ and $r_e = \frac{26 \text{ mV}}{I_E}$.



26. Derive an expression for the I/P impedance of a negative feedback amplifier.
27. Find v_o for the circuit given below :



28. With a neat circuit diagram explain the working of Hartley oscillator.
29. The antenna current before modulation is 10 A and it rises to 12 A after modulation. Determine the m_a , if carrier power is 10 kW. What is the total power after modulation?
30. Explain with a block diagram and truth table, the action of J-K flip-flops.
31. Draw the labelled diagram of digital computer and explain the function of any two blocks briefly.

PART - D

- I. Answer the following question. 1 × 6 = 6
32. Draw the pin configuration of IC7402. Describe how AND, OR and NOT gates are realized from it experimentally.
- OR
- Describe an experiment of an Op-Amp as a three i/p adder.
- II. Answer any five questions. 5 × 6 = 30
33. a) Draw and explain the input and output characteristics of an *n-p-n* transistor in CE configuration.
- b) Prove that $\alpha = \frac{\beta}{1 + \beta}$. 4 + 2
34. What is differential amplifier? Explain with a circuit diagram working of dual input unbalanced output differential amplifiers.
35. a) What is an inverting amplifier? Obtain an expression for its o/p voltage.
- b) Design an inverting amplifier to obtain an o/p voltage - 8 V, when i/p voltage is 1 V. Take $R_f = 100 \text{ k}\Omega$. 4 + 2
36. a) Two capacitors in a Colpitts oscillators have values of 0.2 μF and 0.02 μF . If the frequency of oscillation is 10 kHz, find the value of inductor used in the circuit.
- b) Write any two applications of crystal oscillator. 4 + 2
37. a) Derive an expression for the instantaneous voltage of an AM wave.
- b) Define critical frequency.
- c) Define modulation index of an AM. 4 + 1 + 1
38. a) Explain with a neat circuit diagram the action of linear diode detector.
- b) Distinguish between a Quad and an Octet. 4 + 2
39. a) Simplify the Boolean function
 $f(A, B, C, D) = \sum m(1, 3, 7, 11, 15) + \sum d(0, 2, 5)$
 using K-map.
- b) Find BCD and excess-3 code equivalents of $(32)_{10}$. 4 + 2
40. Draw the labelled block diagram of monochrome TV transmitter and briefly explain its function.
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