Code No. **40**

Total No. of Questions : 40]   [Total No. of Printed Pages : 7

March, 2009

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. Define current gain of CE-amplifier.

2. Define CMRR.

3. How does the input impedance changes with negative feedback in voltage series feedback amplifier ?

4. When does a comparator produces zero output, if it is properly biased ?

5. What is the condition to initiate oscillations in oscillators ?

6. What is signal fading ?

7. In a 10 kHz frequency signal, frequency modulates a carrier with a frequency deviation of 40 kHz. What is its modulation index ?

8. Write the logic symbol of 2-input XNOR-gate.

9. What is the output of a *D* (data or delay) flip-flop when its input is high and clock input is zero ?

10. Expand MAN with reference to computer networking.

[Turn over

PART – B

Note : Answer any *ten* questions.   10 × 2 = 20

11. Draw the circuit diagram of a logic NOT-gate using transistor.

12. In a transistor I_C = 1 mA and I_E = 1·02 mA. Calculate β.

13. What is a phototransistor ? Draw its symbol.

14. Mention any two advantages of negative feedback.

15. For an inverting Op-Amp, if R_f = 100 kΩ and R_1 = 5 kΩ and the input voltage is 400 mV, calculate its output voltage.

16. What is Piezoelectric effect ?

17. Draw the block diagram of communication system.

18. If an AM-transmitter produces 80% modulation for a signal amplitude of 2 V, what is the carrier amplitude ?

19. What is pre-emphasis ? Is this process used in FM-receiver ?

20. Write the truth table of two input DTL-NOR gate.

21. Convert $(110010101)_2$ into gray code.

22. Expand the terms GSM and CDMA used in cellular communication system.

PART – C

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

23. Using the following data, draw the output characteristics of a transistor in CE-mode and also find β of a transistor from the graph. Given I_B = 40 μA.

V_{CE} (volt)	0	1	2	3	4	5
I_C (mA)	0	4	4·1	4·2	4·3	4·4

OR

Using the following data, calculate the theoretical and experimental value of frequency of RC-Phase shift oscillator.

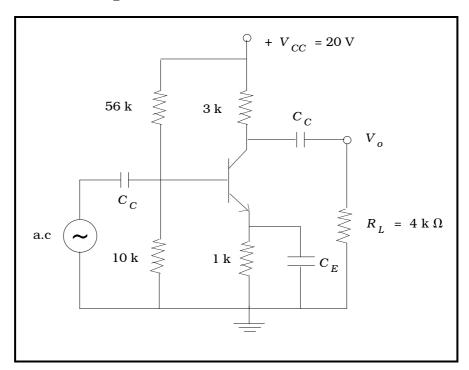| R	C	T	Frequency	
(kΩ)	(μ F)	(ms)	Theoretical	Experimental
1·0	0·1	1·5		
4·7	0·01	0·72		

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

24.   For the given circuit, calculate

i) $\gamma_{in\,(base)}$

ii) γ_o and

iii) A_V .

Given $\gamma_e = \dfrac{26\ mV}{I_E}$, β = 100, Neglect V_{BE} .

25. Explain the working of a CE-Amplifier with a relevant circuit diagram and waveforms.

26. Draw the block diagram of voltage series negative feedback amplifier. Derive the expression for voltage gain.

27. Derive an expression for output voltage of Op-Amp integrator along with the circuit diagram.

28. With a circuit diagram, explain the working of Colpitts oscillator. Write the expression for frequency of oscillation.

29. An AM-transmitter radiates 800 W of power through the antenna at 75% modulation. Calculate the

    i)   carrier power

    ii)   single side band power.

30. Draw the block diagram of SHD-AM reciever. Sketch the waveforms at each stage.

31. Simplify the following expression using K-map and draw its simplified logic circuit using basic gates :

    $F (A, B, C, D) = \sum m (0, 1, 3, 4, 5, 6, 7, 12, 13, 14) + \sum d (2, 15)$

PART – D

I.   Answer the following question :   1 × 6 = 6

32. Describe an experiment to study two-input Op-Amp adder. Draw the
     pin diagram of IC 741.

                                    OR

     Describe an experiment to realise Basic gates and XNOR-gate using
     IC-7402 and verify their truth tables. Draw pin configuration of
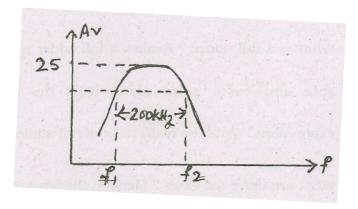   IC-7402.

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

33. a)   What is a cascade amplifier ? Mention one application of
          RC-coupled Amplifier.   2

     b)   Explain the working of a two-stage RC-coupled amplifier with a
          circuit diagram.   4
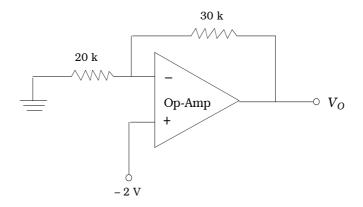
34. a)   Draw the circuit diagram of CB-configuration of a transistor to
          study its characteristics. Draw the input characteristics and
          determine the dynamic input.   4

     b)   Calculate the upper cut-off frequency and 3 dB gain from the
          figure below, where f_1 and f_2 are 3 dB frequencies.   2

35. a) Obtain the expression for the output voltage of a subtractor with

   a circuit diagram.   4
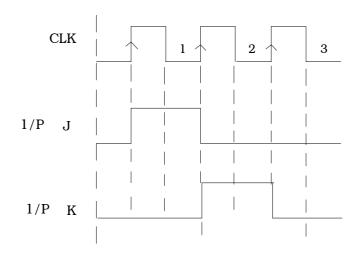
   b) Calculate the output voltage of the given circuit.   2

36. a) Explain the working of a Wien bridge oscillator with a circuit

   diagram.   4

   b) If $k = 4$ and $t = 0\cdot2$ mm, determine the natural frequency of a

   crystal.   2

37. Draw the block diagram of FM-transmitter. Briefly explain the

   functions of each block.   6

38. a) What is a full adder ? Realise a full adder using 3-input XOR-

   gate and basic gates along with the resulting output expressions.

   Write the truth table of full adder.   4

   b) What are universal gates ? Mention the types.   2

39. a) Sketch the output waveforms of JK-flip flop across the normal

    output terminal (φ), for the given timing diagram.   2

    b) What is ALU ? Explain.   2

    c) Write the truth table of a clocked RS-flip flop.   2

40. Draw the block diagram of monochrome TV-transmitter and write the

    functions of each stage.   6