Government of Karnataka

Karnataka School Examination and Assessment Board (KSEAB)

Model Question Paper – 1

Subject: **II PUC Electronics (40)** **Academic Year: 2024-25**

[Time: 3 Hours] **[Total No. of Questions: 45]** **[Max. Marks: 70]**

Instructions:

1. For PART-A questions, only the first written answers will be considered for evaluation.
2. Part – D consists of two sections.
   Section - I is of essay type questions and Section - II is of problems.
3. Circuit diagram and truth tables must be drawn wherever necessary.
4. Solve the problems with necessary formulae.
5. For questions having diagrams, alternate questions are given at the end of the question paper in separate section for visually challenged students.

PART A

I. Select the correct answer from the choices given: **15 x 1 = 15**

1. Name a unipolar device.
   a) Diode b) BJT c) FET d) TRIAC
2. For faithful amplification the operating point is chosen at the
   a) Centre of the active region b) Cut off region
   c) Saturation region d) Inversion region
3. What is the phase difference between input and output of a transistor CB amplifier?
   a) 0^0 b) 60^0 c) 90^0 d) 180^0
4. What happens to the input impedance of an amplifier when voltage series negative feedback is applied?
   a) Remains same b) Increases
   c) Decreases d) Oscillates
5. Voltage gain of an ideal Op-amp is
   a) 0 b) ∞ c) 10^6 d) 1000
6. Zero crossing detector is an application of
   a) Subtractor b) Adder
   c) Comparator d) Inverting amplifier
7. Mention the high frequency stability oscillator
   a) Crystal oscillator b) Hartley oscillator
   c) Wein bridge oscillator d) Colpitts oscillator
8. Name the layer of Ionosphere.
   a) D layer b) E layer c) F layer d) All of these

9. How many sidebands are present in AM?
   a) 1 b) 2 c) 3 d) ∞
10. A SCR has
   a) Two junctions and three layers b) Three junctions and three layers
   c) Three junctions and four layers d) Four junctions and three layers
11. Logic expression for the output of XOR gate is
   a) Y = $\overline{A\,B}$ b) Y = $\overline{A+B}$ c) Y = $\overline{A}B + A\overline{B}$ d) Y = $\overline{A}\overline{B} + AB$
12. The logical AND term is called
   a) Sum term b) Product term c) Sum of Product d) Product of sum
13. How many timers are present in 8051 microcontroller?
   a) 1 b) 2 c) 3 d) 4
14. Size of an integer in C programming is
   a) 1 byte b) 2 byte c) 4 byte d) 8 byte
15. Shapes of cells in mobile network operation system is
   a) Octagonal b) Circular c) Oval d) Hexagonal

II. Fill in the blanks by choosing appropriate answer from those given in the bracket: 5 x 1 = 5

[a) data b) modulation c) slew rate d) feedback e) impedance f) damped]

16. CC amplifier is used to match ……
17. The rate of change of output voltage of op-amp is called ……
18. Electrical oscillations whose amplitude decreases with time are known as …… oscillations.
19. Process of changing some characteristics of carrier in accordance with instantaneous value of the modulating signal is called ……
20. Flip-Flops are used to store …….

PART B

III. Answer any FIVE questions: 5 x 2 = 10

21. What is the need for transistor biasing?
22. An amplifier with Z_i = 1 kΩ has a voltage gain A = 1000. If a negative feedback of β = 0.01 is applied to it. Calculate the input impedance of the feedback amplifier.
23. A Hartley oscillator having L_{eq} = 1 µH and C = 5 pF. Determine frequency of oscillations.
24. Name any two types of modulation.
25. Mention any four power devices.
26. Write minterm designation table for three input variables.
27. Give any two comparisons between Microprocessor and Microcontroller.
28. Mention any two advantages of digital cell phone system.

PART C

IV. Answer any FIVE questions: 5 x 3 = 15

29. What are drain characteristics? Obtain a relation between FET parameters.
30. Define the terms open loop gain, closed loop gain and feedback fraction.
31. Draw the circuit diagram of phase shift oscillator. Write the expression for its frequency of oscillations.
32. Define Critical angle, Critical frequency and Skip distance.
33. Sketch the carrier, modulating signal and AM wave when (a) $m_a = 0.5$ (b) $m_a = 1$ and (a) $m_a = 1.5$
34. Determine V_{dc} and I_{dc} of SCR HWR. Given firing angle is 30^0 and rms voltage of ac input to the rectifier is 230 V and load is 10 Ω.
35. Convert $(1101)_2$ into gray code using XOR gates.
36. Explain briefly satellite communication system.

PART D (Section I)

V. Answer any THREE questions: 3 x 5 = 15

37. Explain the working of CC amplifier.
38. Obtain an expression for the output of op-amp integrator.
39. Draw the pin diagram of IC 7400. Realize NOT, AND, OR and XOR gates using NAND gates.
40. Write ALP program to divide EDH by 1EH and store the quotient in R0 and remainder in R1.
41. Write a C program to accept two integer numbers and print whether they are equal or not equal.

PART D (Section II)

VI. Answer any TWO questions: **2 x 5 = 10**

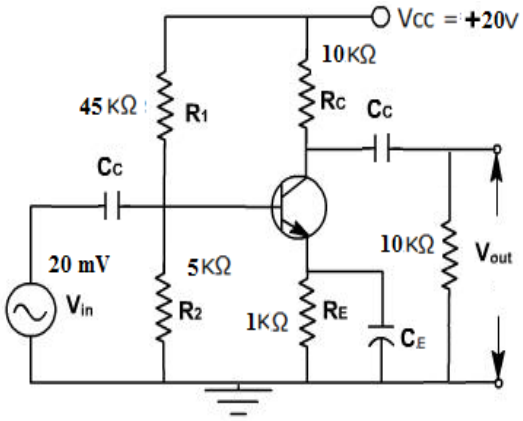
42. CE amplifier circuit using silicon transistor is shown in figure.

Calculate i) $A_{v,}$ ii) A_i , iii) A_P .

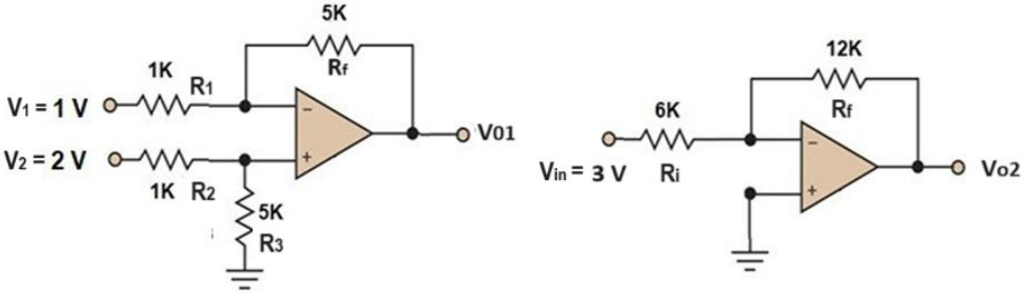
Given I_E = 1.30 mA, β =100,

V_{BE} = 0.7 V

and $r_e' = \frac{26mV}{I_E}$



43. Find the output voltage for the op-amp circuits given below.



(3+2)

44. A modulating signal $10\sin(2\pi x10^3 t)$ is used to amplitude modulate a carrier signal $20\sin(2\pi x10^6 t)$. Find the (a) modulation index (b) percentage modulation (c) frequencies of the sideband components and their amplitude (d) bandwidth of the modulated signal.

45. Simplify the Boolean expression, Y = ∑m (0, 1, 4, 13, 15) + ∑d (2, 5, 7) and then draw the logic diagram for the simplified expression using basic gates.

PART-E

(For visually challenged students only)

42. In a single stage CE transistor amplifier R_1 = 45 kΩ, R_2 = 5 kΩ, R_C = 10 kΩ, R_E = 1 kΩ, V_{CC} = 20 V, I_E = 1.30 mA, β =100, V_{BE} = 0.7 V and $r_e' = \frac{26mV}{I_E}$

Calculate i) $A_{v,}$ ii) A_i , iii) A_P .

43. (a) An op-amp subtractor circuit is given with R_1 = 1 kΩ, R_2 = 1 kΩ, R_3 = 5 kΩ, R_f = 5 kΩ, V_1 = 1 V, V_2 = 2V. Determine the output voltage V_{01}. 3

(b) An op-amp inverting amplifier circuit is given with R_i = 5 kΩ, R_f = 12 kΩ, V_{in} = 3 V Determine the output voltage V_{02}. 2

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