Government of Karnataka

Karnataka School Examination and Assessment Board (KSEAB)

Blueprint for Model Question Paper – 3

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

	Chapters	Hour	Marks	Remember (35%)				Understand (35%)					Apply (20%)				HOTS
				MCQ	SA	LA	LA	MCQ	FIB	SA	LA	LA	MCQ	SA	LA	LA	LA
				1M	2M	3M	5M	1M	1M	2M	3M	5M	1M	2M	3M	5M	5M
1	Field Effect Transistor (FET)	04	04	1							1						
2	Transistor Biasing	03	03		1			1									
3	Transistor Amplifiers	14	12	1					1*			1E				1N	
4	Feedback in Amplifiers	06	06			1		1						1N			
5	Operational Amplifiers	15	13	1			1E	1	1*								1N
6	Oscillators	08	07	1					1*		1			1N			
7	Wireless Communication	04	04					1			1						
8	Modulation and Demodulation	15	12	1		1			1*	1							1N
9	Power Electronics and its applications	08	06	1						1					1N		
10	Digital Electronics	18	18	1			1E		1*	1			1		1N	1N	
11	Microcontroller	10	08		1			1				1E					
12	C Programming	09	06	1			1E										
13	Modern Communication Systems	06	06	1		1				1							
	Total	**120**	**105**	9	4	9	15	5	5*	08	09	10	01	04	06	10	10
				37				37					21				10

* – Fill in the blank,   HOTS – Higher order thinking,   E –Essay type Question,   N-Numerical Problem

Question Paper Pattern			
Subject: II PUC Electronics (40)			
Parts	Marks per Question	Total Questions given including choices	Questions to be answered
Part A – I (MCQ)	1	15Q×1M = 15	15Q×1M = 15
Part A – II (Fill in the Blanks)	1	5Q×1M = 05	5Q×1M = 05
Part B - III	2	8Q×2M = 16	5Q×2M = 10
Part C - IV	3	8Q×3M = 24	5Q×3M = 15
Part D - V Section I (Essay Type)	5	5Q×5M = 25	3Q×5M = 15
Part D - VI Section II (Numerical)	5	4Q×5M = 20	2Q×5M = 10
		105	**70**

Guidelines to question paper setters

Q No. 27 Short answer from microcontroller (meanings of mnemonics to be avoided).

Q No. 34 Numerical on HWR or FWR for the given rms voltage.

Q No. 35 Numerical (excluding POS).

Q No. 37 Working of any one amplifier circuit.

Q No. 38 Derivation on any one op-amp circuit.

Q No. 40 ALP program (from the specified programs in the syllabus).

Q No. 41 C program (from the specified programs in the syllabus).

Q No. 42 Numerical on transistor r_e' model (only silicon transistor).

   Mention $V_{BE} = 0.7$ V and r_e' = 26mV/I_E in the problem.

Q No. 43 Numerical on applications of OP-Amp (excluding differentiator and integrator).

Q No. 44 Numerical on AM.

Q No. 45 Numerical on four variable K-map (two groups).

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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. Unitless parameter of JFET is

    a) Drain resistance   b) Trans-conductance

    c) Amplification factor   d) None of these

2. The operating point is also called as

    a) Cut-off point   b) Quiescent point   c) Saturation point   d) Pinch-off point

3. Small signal amplifiers are also called as
    a) Voltage amplifiers   b) Power amplifiers
    c) Class B amplifier   d) Buffer amplifiers

4. What happens to the bandwidth of an amplifier when negative feedback is applied?
    a) Remains same   b) Increases   c) Decreases   d) Oscillates

5. Slew rate is expressed in

    a) $V/\mu S$ b) $\mu S /V$ c) A/mS d) $\Omega/\mu S$

6. The feedback component of op-amp differentiator is
    a) Resistor   b) Capacitor   c) Inductor   d) Diode

7. Name the oscillator which does not produce phase shift in feedback path

    a) Phase shift oscillator   b) Wein bridge oscillator

    c) Crystal oscillator   d) Hartley oscillator

8. The layer of atmosphere which reflects the radio waves is

    a) Troposphere   b) Stratosphere   c) Mesosphere   d) Ionosphere

9. The intermediate frequency in AM radio receiver is

    a) 455 Hz   b) 455 KHz   c) 455 MHz   d) 455 GHz

10. Identify bidirectional conducting power device.

    a) Power Diode   b) Power Transistor   c) SCR   d) Triac

11. Logic expression for the output of two input XNOR gate is

    a) $Y = AB$ b) $Y = A+B$ c) $Y = \overline{A}$ d) $Y = \overline{A \oplus B}$

12. Gray code is used in shaft position

    a) decoder   b) multiplexer   c) encoder   d) register

13. Microcontroller chip contain

    a) RAM   b) ROM   c) Timer   d) All of these

14. Size of a float data type in C programming is

    a) 1 byte   b) 2 bytes   c) 4 bytes   d) 8 bytes

15. Standard form of GSM is

    a) Global Service for Mobile communication   b) General Service for Mobile communication

    c) Global System for Mobile communication   d) General System for Mobile communication

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

  [a) current   b) twice   c) race around condition   d) oscillator   e) summing   f) heat sink]

16. CC amplifier has the highest ………….. gain.

17. Op-amp inverting adder is also called as ………….. amplifier.

18. Positive feedback is used in …………

19. In Amplitude modulation bandwidth is ……………. the modulating signal frequency.

20. ………………… is the disadvantage of JK flip-flop.

PART-B

III. Answer any FIVE questions. $5 \times 2 = 10$

21. Write the expressions for the coordinates of operating point in voltage divider biasing circuit.

22. Calculate the gain of a negative feedback amplifier with an open loop gain

    A = 100 and feedback factor $\beta = \dfrac{1}{10}$.

23. A RC phase shift oscillator has $R_1 = R_2 = R_3 = R = 10$ kΩ and $C_1 = C_2 = C_3 = C = 0.047$ µF.

Determine frequency of oscillations.

24. Express P_T in terms P_C. What is the upper limit of m_a in AM?

25. Draw two transistor model of a thyristor.

26. Write the logic diagram of D flip-flop.

27. Briefly explain register addressing mode.

28. Mention the important techniques used in Bluetooth operation

PART-C

IV Answer any FIVE questions $\qquad\qquad\qquad\qquad\qquad\qquad$ **$5 \times 3 = 15$**

29. Mention the differences between FET and BJT.

30. Compare input and output impedance characteristics of four types of feedback connections.

31. What is an oscillator? Mention Barkhausen criterion.

32. Draw the block diagram of a communication system and explain the function of each block.

33. Draw the frequency spectrum of an AM wave.

34. Determine V_{dc} and I_{dc} of SCR FWR. Given firing angle is 0^0 and rms voltage of ac input to

the rectifier is 230 V and load is 20 Ω.

35. Convert $(1010)_G$ into binary number using XOR gates.

36. What is RADAR? Mention its two applications.

PART-D (Section I)

V Answer any THREE questions. $\qquad\qquad\qquad\qquad\qquad\qquad$ **$3 \times 5 = 15$**

37. With circuit diagram explain the working of CB amplifier.

38. Derive an expression for output voltage of op-amp non inverting amplifier.

39. What is full adder? Realize full adder using block diagrams of two half adders and an OR gate. Write the truth table of full adder.

40. Write an assembly language program to subtract 35H from 4AH and save the result into register R0. Verify the content of R0 after executing the program.

41. Write a C program to accept the three different integers and print the largest amongst them.
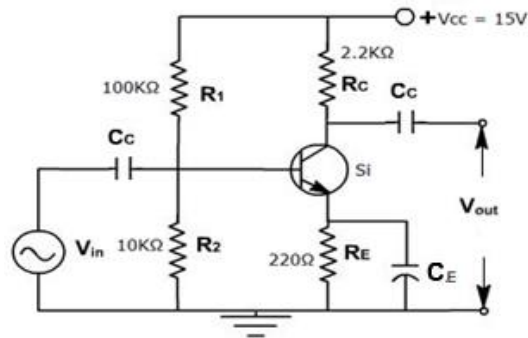
VI Answer any TWO questions. $2 \times 5 = 10$

42. For the CE amplifier circuit shown in the
circuit, find (a) DC voltage across 10 kΩ,
(b) I_E, (c) r_e' (d) $Z_{in(base)}$ (e) Z_o.

Given $r_e' = \dfrac{26 \text{ mV}}{I_E}$ and β = 100.

43. Design an op-amp circuit to realize the output, $V_o = -(3V_1 + 2V_2 + V_3)$. Assume $R_F = 10$ kΩ.

Determine output voltage when $V_1 = 1$ V, $V_2 = -2$ V and $V_3 = 2$ V.

44. The carrier current of an AM transmitter is 8 A, it increases to 8.65 A when the carrier is
amplitude modulated. Find the percentage modulation. Determine the antenna current I_a when the
depth of modulation is 0.75 if carrier current remains same.

45. Simplify the Boolean expression $Y = \Sigma m (0,2,7,8,10,13) + \Sigma d (5,15)$ using K-map. Draw the
NAND gate equivalent circuit to realize the simplified equation.

PART-E

(For visually challenged students only)

42. In a single stage CE transistor amplifier $R_1 = 100$ kΩ, $R_2 = 10$ kΩ, $R_C = 2.2$ kΩ, $R_E = 220$ Ω,
$V_{CC} = 15$ V, β =100, $V_{BE} = 0.7$ V and $r_e' = \dfrac{26mV}{I_E}$.

Calculate (a) DC voltage across 10 kΩ, (b) I_E, (c) r_e' (d) $Z_{in(base)}$ (e) Z_o.

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