Registration No:											

40

26E207

Subject Code **40**

ELECTRONICS

Time : 3 Hours 00 Minutes] **[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, Section – II is of problems.*
3. *Circuit diagram and truth table 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 a separate section for Visually-challenged Students.*

PART – A

I. Select the correct answer from the choices given: **(15 × 1 = 15)**

1) The terminal which controls the flow of charge carriers in a JFET is

a) Source **b) Drain**

c) Emitter **d) Gate**

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) Small signal amplifiers are also called as

a) Voltage amplifiers **b) Power amplifiers**

c) Class - B amplifiers **d) Buffer amplifier**

4) In a voltage-series negative feedback, the closed loop gain of the amplifier is

a) $A_f = \frac{A}{1 - A\beta}$ b) $A_f = \frac{A}{1 + A\beta}$

c) $A_f = \frac{A}{A\beta}$ d) $A_f = A$

5) Phase difference between the input and output of op-amp inverting amplifier is

a) 0° b) 90°

c) 180° d) 270°

6) The feedback component of op-amp differentiator is

a) Resistor b) Capacitor

c) Inductor d) Diode

7) In RC phase-shift oscillator, three RC sections are used to produce a phase-shift of

a) 30° b) 180°

c) 120° d) 90°

8) Line-of-sight waves are also called

a) Surface waves b) Ground waves

c) Sky waves d) Space waves

9) In FM, the ratio of the frequency deviation to the frequency of the modulating signal is termed as

a) Modulation index b) Carrier swing

c) Deviation ratio d) Frequency deviation

10) Drift layer of a power diode is also called

a) Metallization layer b) Anode terminal

c) Epitaxial layer d) Substrate layer

11) In a flip-flop, SET condition stands for

a) $Q = 0, \overline{Q} = 0$ b) $Q = 0, \overline{Q} = 1$

c) $Q = 1, \overline{Q} = 1$ d) $Q = 1, \overline{Q} = 0$

12) The logical AND term is called

a) Sum term
b) Product term
c) Sum-of-product
d) Product-of-sum

13) ALU performs

a) Arithmetic operations only
b) Logic operations only
c) Both arithmetic and logic operations
d) Branching operation

14) What is the meaning of the C operator && (double ampersand)?

a) Bitwise AND
b) Bitwise OR
c) Logical OR
d) Logical AND

15) Carrier of information in optical fiber communication system is

a) copper
b) light
c) water
d) aluminium

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

[a) sequential b) modulation c) unity d) combinational e) zero f) capacitive]

16) Voltage gain of buffer amplifier is _____.

17) A zero cross detector circuit switches its output state when input crosses _____ level.

18) _____ feedback is used in Colpitt's oscillator.

19) Process of changing some characteristics of carrier in accordance with instantaneous value of the modulating signal is called _____.

20) In a _____ logic circuit, output depends on only the present inputs, but not on the previous state of the circuit.

PART – B

III. Answer any FIVE questions: **(5 × 2 = 10)**

21) Mention two leakage currents in a transistor.

22) An amplifier has a bandwidth of 220 kHz and voltage gain of 100. Calculate the bandwidth if $\beta = 0.01$ negative feedback is introduced.

23) In Hartley oscillator, $L_1 = 2$ mH, $L_2 = 4$ mH and $C = 10$ ηF. Determine the frequency of oscillation.

24) Draw the block diagram of AM transmitter.

25) Mention any four power devices.

26) Draw the logic circuit of clocked SR flip-flop using NAND gates.

27) Write any two features of microcontroller 8051.

28) Compare bluetooth and wi-fi.

PART – C

IV. Answer any FIVE questions: **(5 × 3 = 15)**

29) What are drain characteristics? Obtain a relation between FET parameters.

30) Write the advantages of negative feedback in amplifier.

31) Compare RC and LC oscillator.

32) Define SKIP zone, single hop and fading.

33) Derive an expression for modulation index of an AM wave in terms of V_{max} and V_{min}.

34) Determine V_{dc} and I_{dc} of SCR HWR, given firing angle is 90°, $V_{rms} = 230$ V and load is 10 Ω.

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

36) Mention few applications of satellite.

PART – D

(Section – I)

V. Answer any THREE questions: **(3 × 5 = 15)**

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

38) Derive an expression for output voltage of op-amp subtractor.

39) What is half subtractor? Realize half subtractor using NAND gates. Write its truth table along with Boolean expression for difference and borrow.

40) Write an assembly language program to add 35H and 64H using microcontroller 8051. Store the result in register R1. Verify the result.

41) Write a C-program to accept radius (in float) and print area of the circle.

PART – D
(Section – II)

VI. Answer any TWO questions: (2 × 5 = 10)

42) CE transistor amplifier circuit using silicon transistor is shown in fig. 1. Calculate

a) voltage across 10 kΩ

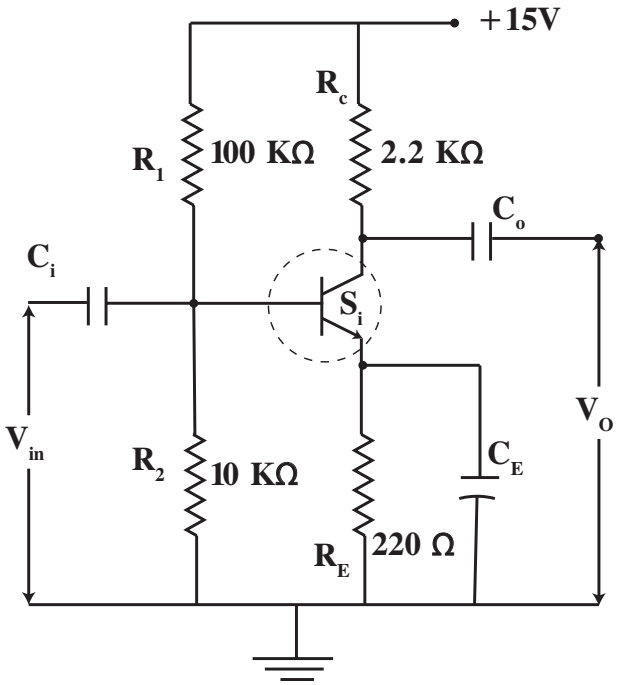
b) emitter current, I_E

c) emitter junction resistance, r_e^1

d) current gain, A_i and

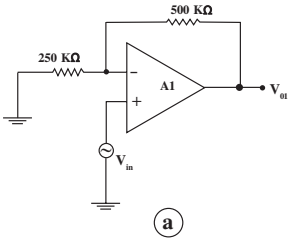
e) voltage gain, A_V

(Use $r_e^1 = \frac{26\ mV}{I_E}$, $\beta = 100$, $V_{BE} = 0.7$ v)



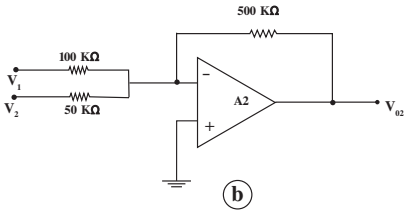
43) Calculate the output voltages of op-amp circuits shown below. (2+3)

Given V_{in} = 10 mV, V_1 = 20 mV and V_2 = 30 mV



a

$M_d = \beta_b Z_p (f_u / \gamma_{mo})$



b

44) A sinusoidal carrier voltage V_c = 80 $\sin(2\pi \times 10^5)t$ is amplitude modulated by a sinusoidal voltage V_m = 32 $\sin(2\pi \times 10^3)t$. Determine

a) modulation index

b) frequency of LSB

c) frequency of USB

d) bandwidth of AM and

e) write the equation of AM wave.

45) Simplify the given Boolean function:

y(A, B, C, D) = ∑m (4, 5, 7, 9, 11, 12, 13, 15) + ∑d (1, 3) using K-map. Realize simplified expression using NAND gates.

PART – E

[For Visually-challenged Students Only]

42) In CE transistor amplifier using silicon transistor,

$R_1 = 100\ k\Omega$, $R_2 = 10\ k\Omega$

$R_E = 220\ \Omega$, $R_c = 2.2\ k\Omega$, $V_{cc} = 15\ V$,

$\beta = 100$, $V_{BE} = 0.7\ V$. $\left(\text{Use } r_e^1 = \frac{26\ mV}{I_E} \right)$

Calculate:

a) Voltage across 10 kΩ

b) Emitter current, I_E

c) Emitter junction resistance, r_e^1

d) Current gain, A_i and

e) Voltage gain, A_V **(5)**

43) a) An op-amp non-inverting amplifier circuit is given with $R_1 = 250\ k\Omega$, $R_f = 500\ k\Omega$ and $V_{in} = 10\ mV$. Determine the output voltage, V_{01}. **(2)**

b) An op-amp adder circuit is given with $R_1 = 100\ k\Omega$, $R_2 = 50\ k\Omega$, $R_f = 500\ k\Omega$, $V_1 = 20\ mV$ and $V_2 = 30\ mV$. Determine the output voltage, V_{02}. **(3)**

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