

ELECTRONICS

Time : 3 Hours 15 Minutes]

[Total No. of questions : 37]

[Max. Marks : 70

- Instructions :** i) Question paper has four Parts A, B, C and D.
- ii) Part - A has no choice.
- iii) Part - D has two Parts.
Part- I is from problems
Part - II is of essay type questions.
- iv) Circuit diagram/timing diagram/truth tables are drawn wherever necessary.
- v) Problems without necessary formula/formulae carry no mark.

PART – A

Answer all questions :

(10 × 1 = 10)

- 1) Define Pinchoff voltage.
- 2) What is the input impedance of an ideal op-amp?
- 3) Mention the number of sidebands present in an AM wave.
- 4) Define frequency modulation.



- 5) Expand MOSFET.
- 6) Convert $(1001)_6$ to binary code.
- 7) Draw the symbol of XOR-gate.
- 8) Write the meaning of MOV R₅, A.
- 9) If $a = 6$ and $b = 9$, what is the content of a after the execution of $a+ = b$ in C programming?
- 10) What is cell splitting?

PART - B

Answer any five questions :

(5 × 2 = 10)

- 11) Derive the relation $\mu = g_m \times r_d$.
- 12) Mention any two characteristics of CC amplifier.
- 13) Draw the block diagrams of voltage shunt and current series negative feedback.
- 14) An amplifier has $z_0 = 10 K\Omega$, voltage gain $A = 150$ and $\beta = 0.02$. Find the output impedance of feedback amplifier.
- 15) Write the pin diagram of IC-555 timer.



- 16) Mention the four modes of operation of TRIAC.
- 17) What is a half subtractor? Write its truth table.
- 18) Give any two applications of Wi-Fi.

PART – C

Answer **any five** questions :

(5 × 3 = 15)

- 19) Define the terms :
 - i) Thermal runaway
 - ii) Leakage current
 - iii) Heat sink.
- 20) Explain the three modes of radio wave propagation.
- 21) Draw the equivalent circuit of transmission lines for high frequency. Mention any two uses of microstrip antenna.
- 22) Explain the operation of power diode under forward biased condition.
- 23) Determine V_{dc} and I_{dc} of SCR half wave rectifier. Given firing angle is 30° and rms voltage of ac input to the rectifier is 30 V and load is 10Ω .
- 24) Mention any three features of PIC microcontroller.



25) For a 8-bit computer, if $A = 0000\ 0101$ and $B = 0011\ 0100$. Compute the following bitwise operators.

- i) $A \& B$
- ii) $A | B$
- iii) $A \wedge B$.

26) Explain with diagram, the working of a satellite transponder system.

PART – D

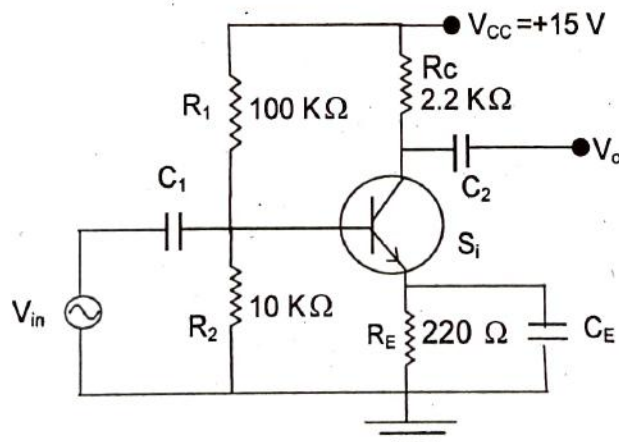
I. Answer **any three** questions :

(3 × 5 = 15)

27) For the CE amplifier using silicon transistor given below, Calculate

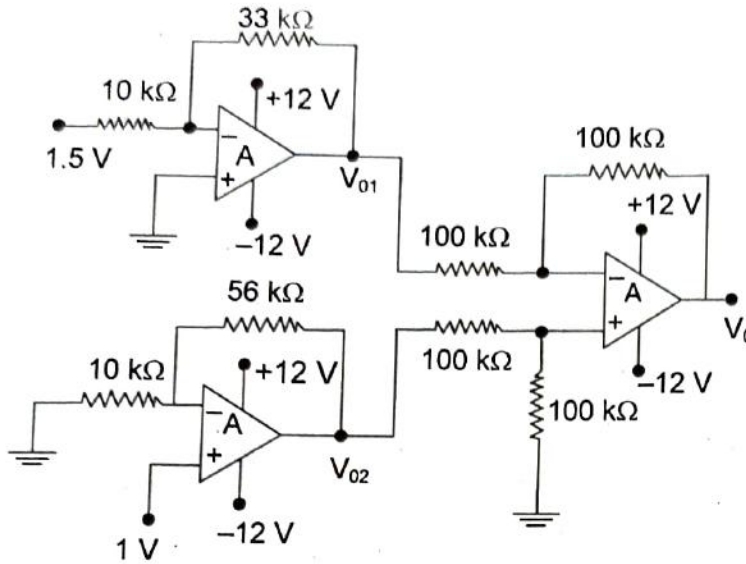
- i) Voltage across R_2
- ii) Emitter current I_E
- iii) Voltage gain A_V
- iv) Power gain A_p .

Given that $r'_e = \frac{26\text{ mV}}{I_E}$ and $\beta = 100$.





28) Calculate the output voltage V_0 for the circuit given below.



29) A Colpitts oscillator circuit generates a frequency of 24 KHz. The capacitors used in the tank circuit are $C_1 = 0.2 \mu F$ and $C_2 = 0.22 \mu F$. Calculate the value of an inductor L and feedback factor β .

30) The output of an AM transmitter is given by

$$400[1 + 0.4 \sin(6280)t] \sin(3.14 \times 10^7 t).$$

This voltage is fed to an antenna of resistance 500Ω .

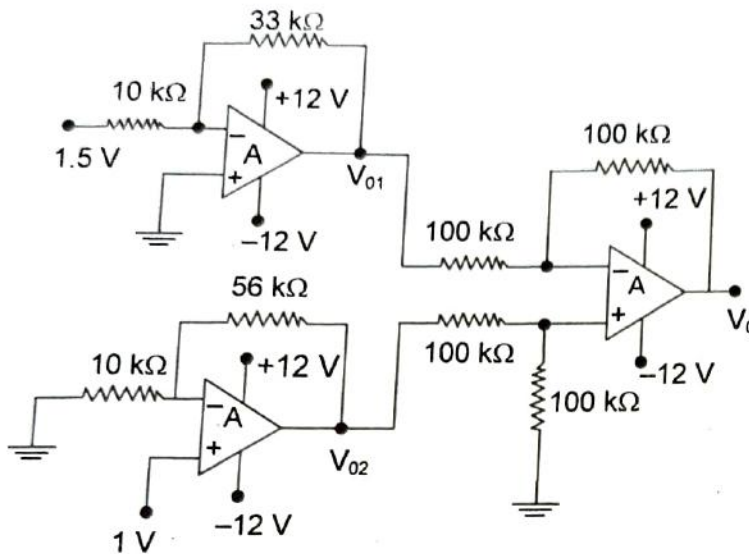
Determine

- i) Carrier frequency
- ii) Modulating frequency
- iii) Carrier power
- iv) Mean power output.

31) Simplify the Boolean expression $Y = \Sigma m(0, 2, 6, 8, 10, 12, 13, 14) + \Sigma d(4, 9)$ using K-map. Draw the NAND-gate equivalent circuit to realize the simplified expression.



28) Calculate the output voltage V_0 for the circuit given below.



29) A Colpitts oscillator circuit generates a frequency of 24 KHz. The capacitors used in the tank circuit are $C_1 = 0.2 \mu F$ and $C_2 = 0.22 \mu F$. Calculate the value of an inductor L and feedback factor β .

30) The output of an AM transmitter is given by

$$400[1 + 0.4 \sin(6280)t] \sin(3.14 \times 10^7 t).$$

This voltage is fed to an antenna of resistance 500Ω .

Determine

- i) Carrier frequency
- ii) Modulating frequency
- iii) Carrier power
- iv) Mean power output.

31) Simplify the Boolean expression $Y = \sum m(0, 2, 6, 8, 10, 12, 13, 14) + \sum d(4, 9)$ using K-map. Draw the NAND-gate equivalent circuit to realize the simplified expression.



II. Answer **any four** questions:

- 32) Draw the circuit diagram of two stage RC-coupled amplifier. Explain its frequency response.
- 33) What is an integrator? With circuit diagram, obtain an expression for output voltage of an op-amp integrator.
- 34) With a labelled block diagram explain the working of FM superhetrodyne radio receiver.
- 35) a) What is a register? Mention the different types of shift registers.
b) Draw the logic diagram of clocked SR flip-flop.
- 36) Write an assembly language program to subtract 23 H from 3 F H when $CY = 0$ and save the result in R_5 .
- 37) Write a C program to accept the radius of a circle and compute its area and perimeter.
-