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03 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answer with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define the terms related to power amplifiers:

i) Gain

ii) Bandwidth.

b) State the function of the level shifting stage. Used in Op-Amp.

c) State advantages of negative feedback in respect to –

i) Bandwidth

ii) Input resistance

iii) Output resistance

iv) Gain stability.

P.T.O.

Marks

d) Compare oscillator and amplifier on the basis of –

i) Type of feedback used

ii) Need of input signal.

e) Define terms related to filters –

i) Roll off rate

ii) Pass band.

f) Draw labelled pin diagram of Op-Amp IC 741.

g) Write the function of –

i) IC 555

ii) IC 565.

2. Attempt any THREE of the following: **12**

a) Define oscillator. State the Barkhavsen's criteria for the generation of sustained oscillations.

b) Explain the working of class A power amplifier with the help of circuit diagram and waveforms.

c) Name amplifier configuration in which virtual ground is present. Explain virtual ground concept with suitable diagram.

d) In closed loop Inverting amplifier, Vin = 1 Vpp sinewave at 1 KHz, R_1 = 470Ω, RF = 4.7kΩ. Determine the value of output voltage Vo. Also sketch input and output voltage waveforms.

3. Attempt any THREE of the following: **12**

a) Define following parameters of Op-Amp. Also write its ideal and typical value –

i) CMRR

ii) Slew Rate.

b) Draw ideal and practical frequency response of –

i) Low pass filter

ii) High pass filter.

c) Design RC phase shift oscillator using IC 741 to produce a sinusoidal output signal at fo = 1 kHz. Draw designed circuit.

Marks

d) Class A power amplifier has an output power of 2W. If amplifier has an efficiency of 25%, the determine the total power drawn from the supply.

4. Attempt any THREE of the following: **12**

a) Describe the working of non-inverting Zero Crossing Detector with the help of circuit diagram and waveforms.

b) Compare active filters and passive filters. (Any four points)

c) Name the distortions occurred in class B push pull amplifier. Write the method to overcome these distortions. Draw waveform of these distortions.

d) Draw the block diagram of PLL. State the function of each block.

e) Compare class A, class B, class C and class AB power amplifier on the basis of –

i) Conduction angle of transistor

ii) Location of Q point.

iii) Efficiency

iv) Collector current waveform.

5. Attempt any TWO of the following: **12**

a) In Schmitt trigger circuit, $R_1 = 100\Omega$, $R_2 = 56k\Omega$, Vin = $1V_{p-p}$ sinewave and Op-Amp is 741 with saturation voltages = $\pm 14V$. Determine:

i) Upper threshold Voltage (Vut)

ii) Lower threshold Voltage (Vlt)

iii) Hysteresis Voltage (Vhy).

b) Write two applications of PLL. Explain any one of them with suitable block diagram and waveforms.

c) Design second order Low Pass Butter worth filter with higher cutoff frequency f_H = 1 KHz. Draw designed circuit and sketch it's frequency response.

Marks

6. Attempt any TWO of the following: **12**

a) Describe the working principle of Hartley Oscillator using IC 741 with circuit diagram. Derive it's formula for frequency of oscillation (Fo).

b) Design second order high pass Butterworth filter with cut off frequency = 10 kHz. Draw designed circuit and sketch it's actual frequency response.

c) Design Astable multivibrator using IC 555 with the frequency of 2 kHz and duty cycle = 50%. Also draw designed circuit. (Assume C = 0.1 μF).

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