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2020

M.Sc.

1st Semester Examination

PHYSICS

Paper - PHS-195

Full Marks: 50

Time: 3 Hours

The figures in the right hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Electronics Practical - I)

Marks Distribution:

Experiment: 50

Total = 50

Perform any *one* from the following experiments and give answers to the corresponding questions within the scheduled time.

(Turn Over)

1) Design a low-pass LC filter (L -type or π -type) circuit having two specified cut-off frequencies. Draw the frequency response curves (with load and without load) and find the cut-off frequencies and compare with the theoretical value.

(a) Theory and circuit diagram 15

(b) Experimental Procedure 30

(c) Discussions 5

2) Implement a circuit to study the drain and transfer characteristics of a JFET common-source amplifier and find out its drain resistance, mutual conductance and amplification factor. Take at least 10 readings for each case.

(a) Theory and circuit diagram 15

(b) Experimental Procedure 30

(c) Discussions 5

3) Design and implement a JK MS Flip-Flop (with Preset and Clear) using NAND gates only and verify its truth-table (for all possible inputs).

(a) Theory and circuit diagram 15

(b) Experimental Procedure 30

(c) Discussions 5

4) Implement a non-inverting op-amp circuit for a particular gain (to be specified by the examiners). Study its linear characteristics up to saturation at $f = 1$ kHz and frequency response characteristics (from 100Hz to 1MHz). Also find out its band-width.

- (a) Theory and circuit diagram 15
 - (b) Experimental Procedure 30
 - (c) Discussions 5
- 5) Implement an inverting op-amp circuit for a particular gain (to be specified by the examiners). Study its linear characteristics up to saturation at $f = 1$ kHz and frequency response characteristics (from 100Hz to 1MHz). Also find out its band-width.
- (a) Theory and circuit diagram 15
 - (b) Experimental Procedure 30
 - (c) Discussions 5
- 6) Design and construct a regulated power supply using op-amp(as a comparator) and power transistor (as a pass element) to supply a maximum load current ($I_L < 150$ mA) at a specified output voltage (voltage and current to be specified by the examiners). Study its load regulation characteristics and calculate the ripple factor for specified three load currents (80 mA,100 mA and 120 mA).
- (a) Theory and circuit diagram 15
 - (b) Experimental Procedure 30
 - (c) Discussions 5
- 7) Design and construct a shift register using D-Flip Flop. Verify its truth table in SIPO and PISO combination.
- (a) Theory and circuit diagram 15
 - (b) Experimental Procedure 30
 - (c) Discussions 5