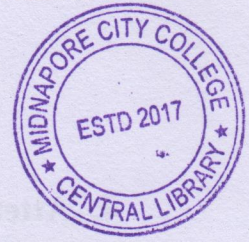


Third Semester Examination-2018**M.Sc. PHYSICS**

Paper Code:PHS-303

Special Paper – I

Full Marks : 40

Time: 2 Hours

Use Separate scripts for Group A & Group B**Group A**

(Electronics: Analog)

(Attempt question number 1 and any one from the rest.)

1. Attempt any five of the following (Marks $2 \times 5 = 10$)
 - a) "A voltage controlled oscillator is nothing but an FM generator" – explain.
 - b) Explain how a D-flip flop can be used as a digital phase detector.
 - c) What are the advantages of a bridge amplifier over a simple stage amplifier?
 - d) Explain how a PLL can be used for demodulation of a FM signal and is there any advantage of using this circuit over conventional FM discriminators?
 - e) How a 7805 fixed voltage regulator IC can be used to generate 9V regulated output.
 - f) Explain how a bridge power amplifier can deliver 4 times power output compared to a single stage power amplifier.
 - g) Draw a circuit of a peak detector using OPAMP.

2. a) Draw the circuit diagram of a 2nd order low pass Butterworth filter and derive the expression for its transfer function. Will this circuit behave as a 2nd order Butterworth filter for any value of gain? Explain. (5)
- b) What is an instrumentation amplifier and why this is needed? Draw the circuit diagram of an instrumentation amplifier using 3 OPAMP and derive the expression for its output voltage in terms of input voltages. (5)

3. a) Write the advantage of switching regulators over series regulators. Explain the detailed operation of a switching regulator with proper diagrams. (5)
- b) Draw the circuit diagram of a voltage controlled oscillator using discrete components and derive the expression for its output frequency. (5)

Group B

(Electronics: Digital)

(Attempt question number 4 and any one from the rest.)

- 4. Attempt any five of the following (Marks $2 \times 5 = 10$)**
- Determine the resolution of a 6 bit DAC in terms of percentage.
 - Why Emitter Coupled Logic (ECL) circuit is fastest among all logic families?
 - Why NMOS and PMOS are economical than CMOS?
 - A memory module contains 8192 bits. How many address lines will be required if the memory module is i) byte oriented and ii) bit oriented?
 - Cascade two 4-to-1 MUX IC chips to make an equivalent 8-to-1 MUX.
 - Why re-use principle is used in a GSM system?
 - What is a packet switching?
- 5. a) Explain a CMOS logic circuit. Why is it so popular? (3+2)**
- b) Implement the function $F = \sum m(0, 1, 2, 4, 6, 8, 10, 12, 14)$ using CMOS logic. (5)**
- 6. a) Show how you can use Emitter Coupled Logic (ECL) circuit as a NOR gate.**
- b) A 5-bit DAC produce an output of 0.1 V for a digital input of 00001. What is the output for an input of 10101.**
- c) Distinguish between multiplexer and demultiplexer.**

