

Mechanical/Automobile

QP Code : **12577**

(3 Hours)

[Total Marks : 80

- N. B. :** (1) Question No.1 is **compulsory**.
(2) Answer any **three** questions from remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. Solve any **four** :-

- (a) Explain different types of diodes based on their operating quadrants of V-I characteristics. 20
- (b) What is the concept of R-L & R-L-E load in case of phase controlled rectifiers?
- (c) Design scaling adder using op-amp to give output as follows
 $V_0 = -(V_1 + V_2 + 3V_3)$ where given inputs V_1, V_2 & V_3 .
- (d) State & prove De Morgan's theorem using truth table.
- (e) What is linear actuator motor? Give two applications.
2. (a) Classify & explain triggering methods of SCR with circuit diagrams. 7
- (b) Compare power BJT, IGBT & MOSFET on the basis of their principle & characteristics. 7
- (c) Explain triac-diac circuit with the help of any one application. 6
3. (a) What is the necessity of inner current loop control circuit? 7
- (b) Write a short note on speed control of a.c. motors. 7
- (c) What is the principle of operation of bridge inverter? Classify them on the basis of applied input. 6
4. (a) What is an instrumentation amplifier? Explain it with block diagram & enlist its applications. 7
- (b) What are the advantages of active filter over passive filter. Draw a circuit diagram and characteristics of active low pass filter using op-amp. 7
- (c) Explain working of monostable mode of operation of IC555 timer. 6
5. (a) Draw and explain functional diagram of MSP430 microcontroller. 7
- (b) What is a servomotor? What are the requirements of a good servomotor? 7
- (c) What are functions of encoder & decoder circuits? 6
6. (a) Select motors for medium power pump & conveyor applications. 7
- (b) Explain with an application significance of multiplexer and demultiplexer circuit. 7
- (c) What are similarities & dissimilarities of microprocessor & microcontroller? 6