

2023

COMPUTER SCIENCE — HONOURS

Paper : CC-4

(Basic Electronic Devices and Circuits)

Full Marks : 50

The figures in the margin indicate full marks.

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

Answer **question no. 1** and **any four** questions from the rest.

1. Answer **any five** questions :

2/5

(a) What are extrinsic semiconductors? Briefly explain with suitable examples. |

(b) Define Thevenin's theorem.

(c) What is the difference between Avalanche and Zener effect? -1

(d) What are the main differences between Bipolar junction Transistor and JFET? -1

(e) What are the Q-point and dc load line of a transistor? -

(f) Derive the relationship between α and β of a transistor. -1

(g) What is LCD?

(h) Write short note on the construction of an Optical fibre.

2. (a) What are the different current components of a transistor? Explain with proper illustrations.

(b) What is LED? How is it different from a normal p-n junction diode?

6+4

3. (a) Explain the Full-wave rectifier circuit with neat labelled circuit diagram.

(b) Draw a neat sketch of an Enhancement mode type p-channel MOSFET and explain its operation in brief.

5+5

4. (a) Explain Switch Mode Power Supply (SMPS) with proper illustrations.

(b) Describe how an Operational Amplifier (OPAMP) functions as a non-inverting adder that can combine three input voltages. Develop the formula to calculate the resulting output voltage. 5+5

5. (a) Explain the operating principle of an Analog to Digital Converter (ADC) whose internal construction is based on Successive Approximation Register (SAR).

(b) Show that the efficiency of a full wave rectifier is around 80%.

6+4

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6. (a) Draw the circuit diagram of a transistor working in common emitter mode and explain its function.
(b) Draw the output characteristics of CE transistor. 6+2+2
(c) What is load line of it?
7. (a) Explain how a transistor can be used as a switch with proper illustrations.
(b) What is the transfer characteristic of a transistor which is used as a switch?
(c) State the difference between intrinsic and extrinsic semiconductor. 5+3+2
8. (a) What is virtual ground? How is it different from the real ground? The explanation should be done with respect to Operational Amplifiers (OPAMP).
(b) Draw the internal diagram of Timer- 555 and explain how it can be used as astable multivibrator. 3+7
9. (a) Show how we can use a Zener diode as a voltage regulator, explain with suitable circuit diagram.
(b) What is the difference between p-n junction diode and a Zener diode?
(c) Explain the working of an Operational Amplifier (OPAMP) as Integrator. 5+2+3