

MSc Degree Examination
Branch II Physics
PH 213 – Basic Electronics

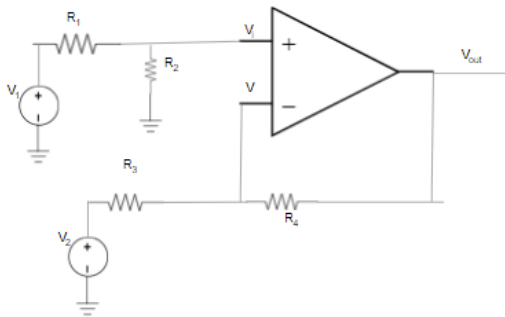
Duration: 3 hours

Maximum marks 75

Part A

Answer any five questions. Each question carries 3 marks

- 1 Draw the circuit diagram of inverting zero crossing detector.
- 2 Explain the working principle of varactor diodes.
- 3 What are the characteristics of an ideal Bode plot.
- 4 Explain the working principle of a diode laser.
- 5 Discuss the role of Erbium-Doped Fiber Amplifier (EDFA) in optical fibre communication.
- 6 Both thermistors and thermocouples are viable options for temperature measurement. Justify the statement.
- 7 Draw the logic diagram and truth table of a full-adder.
- 8 Write an expression for output (V_{out}) of the circuit in the figure.



5x3=15 marks

Part B

Answer three questions. Each question carries 15 marks

- 9
- (a) Design a triangular wave generator for 10 KHz output frequency. 6
 - (b) Explain with circuit diagrams, the principle of first and second order active low-pass filters. 9

OR

- 10
- (a) Explain the working principle of an op-amp schmitt trigger and draw the voltage transfer characteristics. 6
 - (b) Explain the working of Phase Locked Loops (PLL) with necessary block diagram and graphical representations. 9

15 marks

- 11
- (a) Design a mod-10 asynchronous up counter using negative edge-triggered JK flip-flops and draw its timing diagram. 6
 - (b) What is a master - slave JK flip flop ? Discuss its working. 9

OR

12

- (a) Draw the logic diagram of a 4-bit parallel-in, parallel-out (PIPO) register using D flip-flops. 5
- (b) Explain the working of BCD-to-seven segment decoder. Draw the logic circuits and function table. 10
- 15 marks

13

- (a) Discuss the factors affecting the signal distortions in the optical waveguides. 5
- (b) With a neat diagram, explain the working principle of avalanche photodiode. 10

OR

14

- (a) Draw the block diagram of a Cathode Ray Tube (CRT). Explain the functions of each component. 5
- (b) What is a transducer ? Differentiate between active and passive transducers. 10
- 15 marks

Part C

Answer any three questions. Each question carries 5 marks

- 16 Describe a method to convert S-R flip-flop to J-K flip-flop. Draw the logic Diagrams.
- 17 Design a Logic circuit to generate;
- 1) an even parity bit and
 - 2) an odd parity bit for a 3-bit binary input.
- 18 Draw the emission spectrum of ;
- 1) a white LED and
 - 2) 650 nm diode laser on the same graph.
- 19 Compare f_{max} of a 4 bit ripple counter with that of a 4 bit synchronous counter using J-K FFs. The tpd for each FF is 50 ns and tpd for each AND gate is 20 ns. What needs to be done to convert these counters to mod-32? Determine f_{max} for the mod-32 ripple and parallel counters.
- 20 An optical Fiber has an attenuation of 35db/km at 850 nm. If 0.5 mW optical power is initially launched into the fiber, what is the power level in mW after 4 km ?
- 21 Design a second order low-pass filter at a high cutoff frequency of 1kHz and draw the frequency response curve.
- 22 Examine the logic levels at the input of a 54/74L91 and show how a 1 and 0 are shifted into the register.

3x5=15 marks