RAN-2303080101030002

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M.Sc. (Physics) (Sem. - I) Examination November - 2025

PH-413 General Electronics

સૂચના : / Instructions

(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book

Seat No.:

Student's Signature

Q.1. Attempt any two. **(18)**

(A) (i) Define terminology: electric circuit, electronic circuit, active element, Passive element, branch, lumped network, distributed network are used in network solutions . **(5)**

(ii) Give the names of certain types of simple network. Derive the equation for π network in terms of open and short circuit measurement parameters. **(4)**

(B) (i) Write the different names of network theorems. Give the statement and importance of Superposition's Theorem **(6)**

(ii) Discuss the statement proof and application of Norton's Theorem. **(3)**

(C) (i) Give the statement Maximum power transfer Theorem. Also, the condition for transfer of maximum power from a source to load. **(5)**

(ii) Power amplifier has an internal resistance of 5Ω and develops open circuited voltage of 12 V. Find the power efficiency and power tranfered to a load of (i) 20 Ω (ii) 5Ω. Comment on it. **(4)**

Q.2. Attempt any two. **(18)**

(A) (i) Draw the circuit of inverting operating amplifier configuration used as averaging, scaling and summing amplifier. Why inverting operating amplifier are widely used? **(6)**

(ii) Calculate the output voltage of a Non inverting amplifier for values of $V_1 = 2$ V, $R_f = 500$ kΩ and $R_1 = 100$ kΩ. **(3)**

(B) (i) Discuss basic non inverting feedback operational amplifier as voltage to current converter with effect on input and output impendence of them. **(4)**

(ii) What is an integrator operational amplifier? Derive it for non inverting OP-AMP and give application of it. **(5)**

(C) (i) Design and analysis the basic different types of filter and discuss different types of the pass filter. Calculate the cut of frequency of a low pass filter for R =1.2 KΩ and C = 0.02μF. **(5)**

(ii) Write short note: Phase shift oscillator using operational amplifier. **(4)**

Q.3. Attempt any two. **(18)**

(A) (i) What do you mean by digital circuit? Discuss different types of digital circuit and advantages of digital circuit over analog circuit. **(4)**

(ii) What do you mean of Digital Comparator? Design the circuit a single bit comparator circuit depending on relative magnitude of two numbers. **(5)**

(B) (i) Discuss representation of binary numbers of one's complement and 2's complement number system. Using 2's complement method find A - B for A = 001001 and B = 010101. **(5)**

(ii) Describe various numbers of cods and give the details of Excess-3 codes. **(4)**

(C) (i) Describe Demultiplexer with block diagrams and draw circuit and truth table of 1to 4 demultiplexer. **(5)**

(ii) Write short notes Encoder. Draw the seven segment decoder driver circuit and explain the working of it. **(4)**

Q.4. Attempt any two. **(16)**

(A) (i) What are the basic difference between register and shift register? Write the types and explain shift registrar and draw a block diagram of each **(5)**

(ii) Explain serial in- serial out 4 bit shift register by using the JK master-slave flip-flop. **(3)**

(B) (i) Explain combinational and sequenrtial digital circuits, types and application in detail. **(4)**

(ii) Explain in short What is drawbacks of RS Flip flop? **(4)**

(C) (i) What is counter? Explain down counter with IC 7493 circuit diagram. **(5)**

(ii) Give the difference between synchronous counters and asynchronous counters. **(3)**

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