RAN-2003000205020091

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T. Y. B. Sc. (Electronics) (Sem. - V) Examination March - 2023

Theory of Operational Amplifier : Paper - VI

Time: 2 Hours] **[Total Marks: 50**

સૂચના : / Instructions

(1) નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the details of ☛ signs on your answer book

Name of the Examination:
☛ **T. Y. B. Sc. (Electronics) (Sem. - V)**

Name of the Subject :
☛ **Theory of Operational Amplifier : Paper - VI**

Subject Code No.: **2003000205020091**

Seat No.:

Student's Signature

(2) Figure on the right indicates full marks.
(3) All symbols and abbreviations have their usual meaning.
(4) Non-programmable calculators are allowed.
(5) Q.1 is compulsory.
(6) Assume data if necessary.

Q. 1 **Answer in brief:** **08**

1. Why operational amplifier is called so?
2. What is inverting input?
3. What is the special case of an inverting amplifier?
4. What do you mean by dual input balanced output differential amplifier?

Q. 2 (A) Using schematic and ac equivalent diagrams of a dual input balanced output differential amplifier find out its input resistance. **07**

(B) Current supplied by the constant current bias circuit in a dual input balanced output differential amplifier using the diode is 4mA. $V_s = \pm 12V$, Voltage gain of the amplifier is 80. Find the values of R_c, R_2 and R_E. **07**

OR

Q. 2 (A) Discuss different open- loop op-amp configurations. **07**

(B) For the open loop differential amplifier using 741C, determine the output voltage in each of the following cases. **07**

a) v_{in1} = 5 V dc, v_{in2} = –7 V dc

b) v_{in1} = 10mV rms, v_{in2} = 20mV rms.

Q. 3 (A) Explain how instrumentation amplifier is used as temperature controller. **08**

(B) What is current mirror circuit? **06**

OR

Q. 3 (A) Explain how an op-amp can be used as an integrator circuit. Give circuit diagram, frequency response and input & output waveforms. **07**

(B) In an integrator circuit, R_1C_F = 1 second and the input is a step (dc) voltage of 1V. Determine the output voltage and sketch it. Assume that the op-amp is initially nulled. **07**

Q. 4 (A) Derive the expression for voltage gain and input resistance of non inverting amplifier with negative feedback. **08**

(B) The 741C is configured as a voltage series amplifier with R_1 = 1kΩ, R_F = 10kΩ. Compute the closed loop voltage gain. What will be the output voltage if an input voltage of 100mV p-p sine wave at 1 kHz is applied to it? Sketch both the waveforms. **06**

OR

Q. 4 (A) Explain summing and averaging amplifiers using op-amps (inverting configuration). What do you mean by subtractor? **07**

(B) Explain offset voltage compensating network and its design principles. **07**

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