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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester : IV** | **Date :04-JULY-2024** |
| **Course Code :EEE2004\_v02** | **Time :1:30PM-4:30PM** |
| **Course Name :** **Opamps and Linear Integrated Circuits** | **Max Marks :100** |
| **Program :B.Tech** | **Weightage :50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | An operational amplifier is a DC-coupled high-gain electronic voltage amplifier with a differential input and, usually, a single-ended output. Write any five linear and nonlinear applications of op – amps. | (CO 1) | [Knowledge] |
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| 2 | Operational Amplifiers, also known as Op-amps, are basically a voltage amplifying device designed to be used with components like capacitors and resistors. What is a voltage follower? State the conditions to form a voltage follower circuit from Non inverting op amp circuit | (CO 1) | [Knowledge] |
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| 3 | List the performance parameters of the voltage regulators. Also define the significance of the parameters. | (CO 4) | [Knowledge] |
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| 4 | An operational amplifier is an integrated circuit that can amplify weak electric signals. What is a filter? Write some commonly used active filters. | (CO 2) | [Knowledge] |
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| 5 | Operational Amplifiers, also known as Op-amps, are basically a voltage amplifying device designed to be used with components like capacitors and resistors. State the significance of precision diode? Write the applications of precision diode. | (CO 2) | [Knowledge] |
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| 6 | An electronic oscillator is an electronic circuit that produces a periodic, oscillating electronic signal. Write the conditions which are to be satisfied to get a sustained oscillations. | (CO 3) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | Mr. Nayar is looking to upgrade the sound system in his car by reducing the likelihood of interference from sources like low frequency noise signals.  Mr. Nayar comes and approaches you regarding the suitable circuit for attenuating the low frequency Signals. Suggest him a suitable circuit with clear explanation. | (CO 2) | [Comprehension] |
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| 8 | Level detector circuits are very often employed in static relay circuits as a final stage before the trip coil circuit of the circuit breaker. The name level detector is derived from the fact that the circuit operates abruptly when the input level exceeds a predetermined value. Explain the way how an op amp can be used to detect the level of voltage and zero crossing. | (CO 3) | [Comprehension] |
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| 9 | Mr. Parthiv likes to experiment with sensors and transducers. He wants to control the fan speed by sensing the temperature in his room. He used two temperature sensors that generate electrical equivalent signal of E1 and E2, for better accuracy he wants to get the average of these two signals. Discuss the suitable circuit using op-amps. | (CO 1) | [Comprehension] |
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| 10 | Mr. Suraj is using an op amp for his project as comparator circuit and he is not getting the proper results (several transitions in output). Identify the reason for not getting the accurate results and report in which way he operates the comparator circuit, so that he will get the accurate results. | (CO 3) | [Comprehension] |
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| 11 | For a typical rectifier circuit, Mr. Narayan used diodes to rectify AC to DC. But this rectification method can only be used if the input voltage to the circuit is greater than the forward voltage of the diode which is typically 0.7V. But Mr. Narayan wants to get the rectification even below 0.7V for his application. Put yourself in Mr. Narayan place, explain how you get the rectification even below 0.7V with necessary circuit diagram. | (CO 2) | [Comprehension] |
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| 12 | Mr. Thomson wants to operate a load (motor) which needs an input voltage range of 1.2 V to 57 V DC supply. He don’t want to use a power converter system to get the voltage range as stated. Is there any other way through which he can get the required voltage range. If yes/No, explain the same with necessary conditions. | (CO 4) | [Comprehension] |
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| 13 | An op amp is designed to be a general purpose signal conditioning block in any measurement or process control system. The op amp configuration and performance in the circuit will be governed by the electrical character of the sensor and its output. The electrical nature of the sensor output differs from one sensor to the other. In most cases, the principle of operation of the sensor determines the nature of sensor output. Explain the circuit configurations which are used In order to sense the sensor output signal is phase shifted or not. | (CO 1) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | a. Identify a circuit in which only one state is having stable width of a pulse produces a time delay within a circuit since they always produce the same frequency output. Using a timer circuit illustrate the complete operation of the circuit.  b. Design a monostable multivibrator using 555 timer to provide a 5V, 100 ms pulse output each time a trigger is applied to the input. | (CO 3) | [Application] |
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| 15 | a. The video encoder system will process a video signal and send digital signals to a variety of DACs to produce analog video signals of various formats, along with optimizing of output levels. As with audio codecs, these ICs may have integrated DACs. Illustrate the conversion of a DAC for the the following inputs  a. 1000      b. 0010     b. An unregulated DC power supply output changes from 20V to 19.7V when the load is increased from zero to maximum. The voltage also increases to 20.2V, When the AC supply increases by 10%. Identify the performance parameters of the voltage regulators. Compute the listed parameters. | (CO 4) | [Application] |
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| 16 | a. Mr. Gopal wants to design oscillator circuits which are to be used for audio systems. He comes and approaches you for selecting the circuits. Suggest him the oscillators that can be used by him for audio systems.  b. Design a wein bridge oscillator with frequency of 25 KHz. Let C1=C2=C= 1nF, R1=R2=R. Assume the necessary data (As per the standards). | (CO 3) | [Application] |
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