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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester : I** | **Date : 05-07-2024** |
| **Course Code : ECE1006** | **Time : 9:30AM TO 12:30PM** |
| **Course Name : Basic Electronics Engineering** | **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 | A **filter circuit** is one which removes the ac component present in the rectified output and allows the dc component to reach the load. Explain the shunt capacitor filter of rectifier. | (CO 1) | [Knowledge] |
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| 2 | The electronic band structure is an energy scheme to describe the conductivity of conductors, insulators, and semiconductors. It consist of two energy bands and the band gap. Define conductor, insulator and semiconductor and also draw the energy band diagram. | (CO 1) | [Knowledge] |
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| 3 | Diodes connected in parallel share the same voltage but carry individual currents. It offers improved current handling and lower voltage drop. Determine I, Vo for the circuit shown in Figure. | (CO2) | [Knowledge] |
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| 4 | A bipolar junction transistor is a three-terminal semiconductor device which is capable to amplify the input signal. Derive the relation between **α and β** of a transistor. A transistor has β=100. If the collector current is 40mA, find the value of emitter current. | (CO2) | [Knowledge] |
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| 5 | The function of a power amplifier is to raise the power level of input signal. Compare the efficiency for Class-A, Class-B, Class-AB and Class-C power amplifier. | (CO3) | [Knowledge] |
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| 6 | The Junction Field Effect Transistor is a unipolar device in which current flow between its two electrodes is controlled by the action of an electric field at a reverse biased pn-junction. Prove that in JFET | (CO4) | [Comprehension] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | A transistor is a semiconductor device which transfers a weak signal from low resistance circuit to high resistance circuit. Explain the Input and output characteristics of a common emitterconfiguration indicating saturation, cut-off and active region. | (CO2) | [Comprehension] |
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| 8 | A p-n junction diode is a basic semiconductor device that controls the flow of electric current in a circuit. Explain the working of PN Junction Diode in Forward and Reverse bias Condition. What is the effect of temperature on the V-I characteristics of diode? | (CO1) | [Comprehension] |
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| 9 | A voltage multiplier is an electrical circuit that converts AC electrical power from a lower voltage to a higher DC voltage, typically using a network of capacitors and diodes. Explain the full wave voltage Doubler with diagram. | (CO1) | [Comprehension] |
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| 10 | The proper flow of zero signal collector current and the maintenance of proper collector emitter voltage during the passage of signal is known as **Transistor Biasing**. Find the value of IB, IC, VCE, VBC for β=75. Given RB=200KΩ, RC=800Ω, Vcc=20V | (CO2) | [Comprehension] |
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| 11 | Distortion is the inexact reproduction of an input signal at the output of an amplifier. Due to their two-stage design, push-pull amplifiers suffer from crossover distortion of the output waveform around its zero crossover point. Explain Crossover distortion in Class B Amplifier. How it can be avoided. | (CO3) | [Comprehension] |
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| 12 | Biasing is known as setting of initial operating conditions of an active device in an amplifier. Determine VGSQ,IDQ, VDS, VS, VG, VD for a JFET. Given IDSS=10mA, VP= - 4V, RD=3.5KΩ, RG=2MΩ, VDD=35V, VGG= -3V. | (CO4) | [Comprehension] |
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| 13 | A MOSFET is a field-effect transistor with an insulated gate where the voltage determines the conductivity of the device. Deduce the expression for overall voltage gain, input and output impedance in common drain amplifier in MOSFET. Why Common drain amplifier is called as unity gain amplifier? | (CO4) | [Application] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | A MOSFET is a field-effect transistor with an insulated gate where the voltage determines the conductivity of the device. Deduce the expression for overall voltage gain, input and output impedance in common Source amplifier in MOSFET. | (CO4) | [Application] |
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| 15 | BJT amplifier is basically a bipolar junction transistor operated in the active region. It increases the strength of the input signal and produces an amplified output. Explain the frequency response of CE amplifier in LF, HF and mid- band with cut off frequency. Derive the expression of external capacitors on frequency response. | (CO3, CO4) | [Application] |
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| 16 | JFET is a high input impedance device. JFET needs the setting of gate-source voltage VGS to give desired drain current ID. Determine the following in **fig. (viii), (i)** VGSQ **(ii)** IDQ **(iii)** VDS **(iv)** VS **(v)** VG **(vi)** VD **(vii)** VDG. Given IDSS=6mA, VP=-6V. | (CO4) | [Comprehension] |
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