



GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: JUNE 2016

(Regulation 2015)

Second Semester

MECHATRONICS ENGINEERING

U15MCT201 : Electronic Devices and Circuits

COURSE OUTCOMES

- CO1: Use passive elements and basic theorems to solve the electric circuits.
- CO2: Relate the basic semiconductor physics to the characteristics and biasing of low powered electronics devices.
- CO3: Design regulators and rectifiers using diodes.
- CO4: Design amplifiers for oscillators using transistors.
- CO5: Use operational amplifiers to solve simple mathematical operations and build conventional vibrators

Time: Three Hours

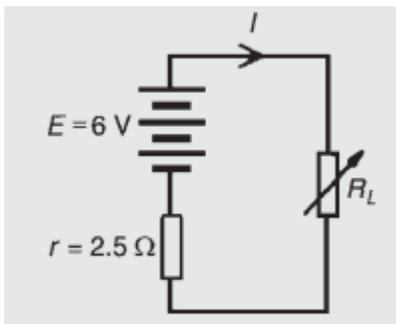
Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A series circuit consists of two resistors 100Ω and 150Ω in series. If the current applied is 100 mA , then calculate the applied voltage CO1 [K₂]
 - a) 100V
 - b) 75 V
 - c) 50 V
 - d) 25 V
2. Transistors are always operated in the region _____ Knee voltage CO2 [K₁]
 - a) Above
 - b) Below
 - c) A_t
 - d) Zero

3. Which of the following terms could be used to describe a negative-half rectifier CO3 [K₂]
- a) A negative series clipper b) A negative shunt clipper
 c) A positive series clipper d) Combinational clipper
4. An ideal operational amplifier has CO5 [K₂]
- a) infinite output impedance b) Zero Input impedance
 c) Zero output impedance d) finite bandwidth
5. The purpose of coupling capacitor in a transistor amplifier is CO2 [K₃]
- a) to increase output impedance of transistor b) protect the transistor
 c) pass a.c and block d.c d) provide biasing
6. The circuit diagram given below shows dry cells of source e.m.f. 6 V, and internal resistance 2.5 Ω. If the load resistance R is (0.5, 2.5, 3.0, 3.5, 5.0) Ohms, calculate the power dissipated by the load in each case. The correct sequence in order of changes in load with respective power CO1 [K₂]

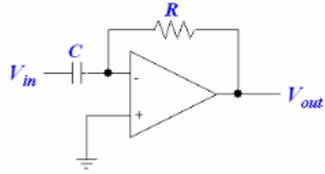
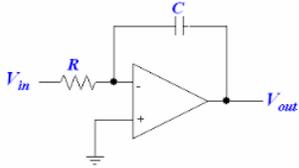
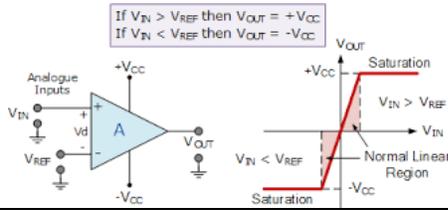
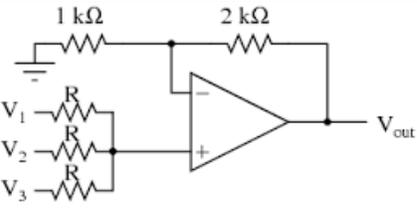


| S.NO. | P Watts |
|-------|---------|
| 1 | 3.50 |
| 2 | 3.60 |
| 3 | 2.00 |
| 4 | 3.57 |
| 5 | 3.20 |

- a) 3 – 2 – 4 – 1 – 5 b) 4 – 3 – 2 – 1 – 5
 c) 2 – 3 – 1 – 5 – 4 d) 1 – 3 – 4 – 5 – 2
7. One condition for positive feedback is that the phase shift around the feedback loop must be CO4 [K₂]
- a) 0 degree b) 90 degree
 c) 180 degree d) 45 degree
8. Assertion (A): In a common collector amplifier, voltage gain is greater than unity and this configuration is called as Emitter follower CO2 [K₁]
 Reason (R): Common collector stage is used for impedance matching as its input impedance is very large as compared to output impedance.
- a) Both A and R are individually true and R is the correct explanation of A b) Both A and R are individually true and R is not the correct explanation of A
 c) A is true but R is false d) A is false but R is true
9. A Schmitt trigger is CO5 [K₁]
- a) a comparator with only one trigger point. b) a comparator with hysteresis
 c) a comparator with three trigger points d) a comparator with no trigger points

10. Match the following

CO5 [K₂]

| List I | List II |
|-------------------|---|
| A. Integrator | i.  |
| B. Summer | ii.  |
| C. Differentiator | iii.  |
| D. Comparator | iv.  |

| | A | B | C | D |
|----|-----|----|-----|-----|
| a) | ii | iv | i | iii |
| b) | iv | i | iii | ii |
| c) | i | iv | ii | iii |
| d) | iii | i | iv | ii |

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

- Define superposition theorem with its steps.
- Diode acts as a switch – Justify with reason
- What is voltage multiplier circuit?
- Give the characteristic parameters of JFET
- Draw the circuit diagram for half wave rectifier
- What approach is prepared to build a voltage regulator?
- Draw the Hartley oscillator circuit.

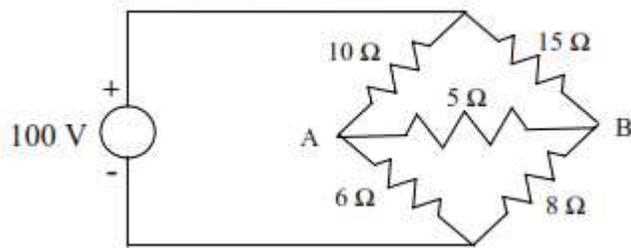
- CO1 [K₂]
 CO2 [K₄]
 CO3 [K₂]
 CO2 [K₂]
 CO3 [K₁]
 CO3 [K₃]
 CO4 [K₁]

- | | | |
|--|-----|-------------------|
| 18. List the major factors govern the Ideal characteristics of an Op amp. | CO5 | [K ₂] |
| 19. Draw the summer circuit using op amp. | CO5 | [K ₁] |
| 20. List out the condition to maintain a stable oscillation and name the criteria. | CO4 | [K ₂] |

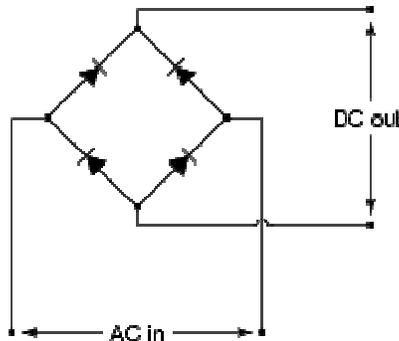
Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

- | | | |
|--|-----|-------------------|
| 21. With the aid of a circuit diagram, explain the input and output characteristic of a common emitter N-P-N transistor. | CO2 | [K ₃] |
| 22. Find the current in the 5 ohms, load resistor and the power consumed in it by using Thevenin's theorem In figure shown below | CO1 | [K ₂] |



- | | | |
|---|-----|-------------------|
| 23. Explain the action of a p-n junction diode: (a) on open-circuit, (b) When provided with a forward bias, (c) When provided with a reverse bias. Sketch the characteristic curves for both forward and reverse bias conditions. | CO2 | [K ₂] |
| 24. Explain the effect of negative feedback on gain and bandwidth of a system. | CO4 | [K ₂] |
| 25. Draw and Explain the Schmitt trigger with respective waveforms. | CO5 | [K ₃] |
| 26. i) Draw the circuit with proper polarity at output with respect to the diagram shown below. (4) | CO3 | [K ₄] |
| ii) Draw the output waveform for the circuit shown in figure if the input is sine wave with 50Hz 12V AC supply (6) | | |
| iii) Drive the output DC voltage for the given 12Volts AC supply. (4) | | |



- | | | |
|---|-----|-------------------|
| 27. Draw the circuit diagram of Wien Bridge oscillator and explain its working. | CO4 | [K ₃] |
|---|-----|-------------------|
