Printed Page:-04 Subject Code:- BEC0201

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2024 - 2025)

Subject: Basic Electrical and Electronics Engineering

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. The internal voltage drop of a voltage source…..... (CO1,K1) 1

(a) Is independent of load current supplied

(b) Depends upon internal resistance of the source

(c) Does not influence the terminal voltage

(d) Does affect the emf of the source

1-b. A linear circuit is one whose parameters (e.g.resistances etc.) ..... (CO1,K2) 1

(a) change with change in current

(b) change with change in voltage

(c) do not change with voltage and current

(d) none of the above

1-c. A sinusoidal voltage has peak to peak value of 100 V. The rms value is (CO2,K3) 1

(a) 50

(b) 70.7

(c) 35.35

(d) 141.41

1-d. The unit of apparent power is (CO2,K1) 1

(a) KVA

(b) KVAR

(c) KW

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(d) Watt

1-e. An ideal transformer will have maximum efficiency at a load such that _____(CO3,K2) 1

(a) copper loss > iron loss
(b) cannot be determined
(c) copper loss = iron loss
(d) copper loss < iron loss

1-f. For a transformer with primary turns 100, secondary turns 400, if 200 V is applied at primary we will get _____(CO3,K3) 1

(a) 3200 V at secondary
(b) 1600 V at secondary
(c) 800 V at secondary
(d) 80 V at secondary

1-g. An intrinsic semiconductor at absolute zero..... (CO4,K1) 1

(a) Becomes extrinsic semiconductor
(b) Behaves like an insulator
(c) Disintegrates into pieces
(d) Becomes superconductor

1-h. A semiconductor has ..... temperature coefficient of resistance (CO4,K2) 1

(a) Positive
(b) Negative
(c) Both may be possible
(d) None of the above

1-i. What is the ideal voltage gain of an op-amp? (CO5,K1) 1

(a) 0
(b) 1
(c) ∞
(d) It varies depending on the op-amp model

1-j. In a non-inverting amplifier configuration, the voltage gain is determined by:(CO5,K2) 1

(a) The feedback resistor (Rf) alone
(b) The input resistor (Rin) alone
(c) Both the input resistor (Rin) and the feedback resistor (Rf)
(d) The op-amp's power supply voltage

2. Attempt all parts:-

2.a. Define unilateral and bilateral elements. (CO1,K2) 2

2.b. Define form factor and Crest factor in A.C circuit (CO2,K2) 2

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2.c. In a transformer iron loss is 600 W at full load. These losses at half load will be (CO3) 2

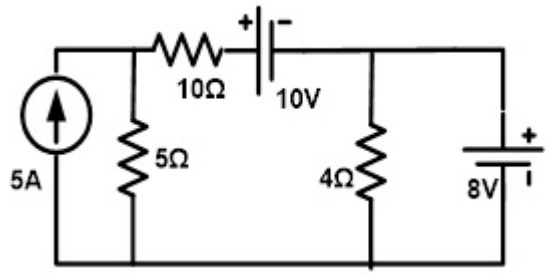
2.d. Calculate the rectification efficiency of Bridge rectifier. (CO4,K3) 2

2.e. Write down the Ideal characteristics of op-amp. (CO5,K2) 2

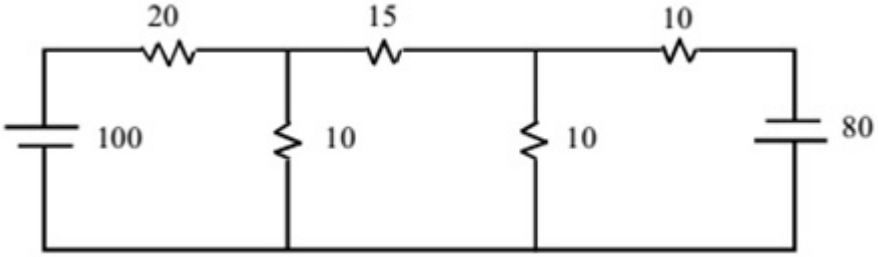
SECTION-B 30

3. Answer any five of the following:-

3-a. Determine the current in all the branches using nodal analysis. (CO1,K3) 6



3-b. Find the current in various branches of circuit. Using mesh Analysis. (CO1,K3) 6



3-c. A coil of resistance 40 Ω and inductance 0.75 H is connected in series with loss free capacitor of capacitance C. The resonance frequency of the circuit is 55 Hz. If the circuit is connected from a 250 V, 50 Hz AC supply then find power factor and power consumed in the circuit (CO2,K3) 6

3-d. Derive the expression of Bandwidth of a series RLC circuit. Explain the relationship between bandwidth and quality factor. (CO2,K3) 6

3.e. What is the working principle of Transformer? Why Transformer does not work on DC supply? (CO3,K2) 6

3.f. Explain the following terms: (a) Potential Barrier (b) Knee Voltage (c) PIV (d) Reverse bias (CO4,K2) 6

3.g. Draw the circuit diagram of inverting and non inverting amplifier and derive the expression for output voltage.(CO5,K3) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Derive the expression for Star to Delta transformation. (CO1,K3) 10

4-b. State and prove maximum power transfer theorem. Enumerate limitations of Superposition theorem (CO1,K2) 10

5. Answer any one of the following:-

5-a. For an AC circuit expression of voltage and current are given as v = 200 Sin 10

(377t) V and i = 8 Sin (377t – 30) respectively. Find:(a)Power Factor (b) True Power (c)Apparent Power (d)Reactive Power (CO2,K3)

5-b. Derive an expression for average and rms value of half wave rectified cycle .Also find the form factor and crest factor of the mentioned waveform (CO2,K2) 10

6. Answer any <u>one</u> of the following:-

6-a. Discuss about thermal power plant and its site locations in India with their capacities. Also mention its advantages and disadvantages. (CO3,K2) 10

6-b. The efficiency of a 400 KVA transformer is 98.77% at full load, 0.8 p.f and 99.13% at half load, unity power factor . Find iron loss & copper loss at both full & half load.(CO3,K3) 10

7. Answer any <u>one</u> of the following:-

7-a. Explain what is PIV. Also calculate PIV ,Ripple factor and Rectifier efficiency for Half Wave Rectifier . (CO4,K3) 10

7-b. State and explain the characteristics of Zener diode. How it can be used as a voltage regulator? (CO4,K2) 10

8. Answer any <u>one</u> of the following:-

8-a. List the various sensors used in IoT and give their application. (CO5,K2) 10

8-b. Draw and explain the Block diagram of Digital multimeter. Give some applications of it. (CO5,K2) 10

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