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A full wave bridge rectifier fed from 15 vrms ac source and is connected across a 100 Ω load

Calculate

PIV (1)

RMS current drawn from the supply

(iii) Average dc current across the load.

2 + 3 + 5

Write short notes on any two of the following:

 2×5

- Thermal runaway
- Junction capacitance
- Avalanche breakdown
- Dc load line and Q-point.

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CS/B.Tech(N)/SEM-1/ES-101/2013-14 2013

BASIC ELECTRICAL & **ELECTRONICS ENGINEERING - I**

ne Allotted: 3 Hours

Full Marks: 70

THIS QUESTION BOOKLET CONSISTS OF 2 PARTS -PART I & PART II. TO ANSWER THE QUESTIONS USE SEPARATE ANSWER BOOKS FOR SEPARATE PARTS. DO NOT ANSWER BOTH THE PARTS IN THE SAME ANSWER-BOOK.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

> PART - 1 (Marks : 35)

GROUP - A

(Multiple Choice Type Questions)

Choose the correct alternatives for any five of the following:

 $5 \times 1 = 5$

Turn over

- 20 Ω resistor is stretched to increase its length double. Its resistance will now be
 - 40 Ω a)

 20Ω

10 Ω c1

 5Ω .

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- ii) A sinusoidal voltage is represented by $u = 141.4 \sin (314.18i 90')$ The r.m.s. value of the voltage, its frequency and phase angle are respectively
 - a) 141 42 V. 314 16 Hz, 90°
 - b) 100 V. 50Hz, ~ 90*
 - c) 87.92 V, 60 Hz, 90°
 - d) 200 V, 56 Hz, 90°.
- iii) The reluctance of a magnetic circuit is given by
 - a) (/μ₀μ_rα

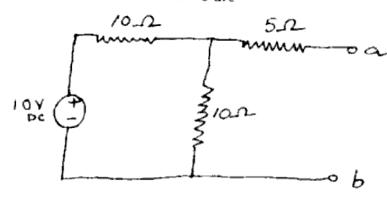
b) φ/*NI*

c) 1/µ,a

d) $U\mu_0 a$.

with usual nomenciature.

(v) For the circuit shown, the Thevenin's voltage and resistance as seen at a - b are



al 5 V, 10Ω

b) 10 V, 10Ω

c) 5 V, 5Q

- d) 15 V. 15Ω.
- v) Three resistors 4Ω, 6Ω and 8Ω are connected in parallel. In which resistor power dissipated will be maximum?
 - a) 4Ω

b) 6 Ω

cl 8 Ω

- d) Equal in all resistors
- vi) Time constant of LR circuit is given by
 - a) L/R

b) R/L

c) 1/LR

d) LR.

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GROUP - B

(Short Answer Type Questions)

Answer any two of the following: $2 \times 5 \approx 10$

- State and prove Ampere's Circuital law.
- 3 What is resonance? Deduce the expression of frequency in a parallel RLC circuit at resonance.
- Draw comparison between electrical and magnetic circuit.
- A two element series circuit consumes 700 V of power and has power factor of 0-707 leading when energized by a voltage source of waveform v = 141 sin (314t + 30°). Find out the circuit elements.

GROUP - C

(Long Answer Type Questions)

Answer any two of the following.

 $2 \times 10 = 20$

- a) Derive the expression of quality factor of a series R-L-C circuit at resonance.
 - b) A coil of resistance 10Ω and inductance 0.02 H s connected in series with another coil of resistance 6 Ω and inductance 15 mH across a 230 V, 50 Hz supply. Calculate:
 - (i) impedance of the circuit
 - (ii) voltage drop across each coil
 - (iii) the total power consumed by the circuit 2 + 2 + 2
- a) State and prove maximum power transfer theorem.
 Show that under maximum power transfer condition, efficiency is 50%.

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A Wheatstone bridge consists of $AB = 4\Omega$. BC = 3 $CD = 6 \Omega$ and $DA = 5 \Omega$. A 2.4 V battery is connect between points B and D A galvanometer of 8resistance is connected between A and C Usir Thevenin's theorem find the current through th galvanometer

- Derive an expression for lifting power of a magnet.
 - An iron ring of mean length 50 cm, has an air-gap o 1mm and winding of 200 turns. The relative permeability of iron is 300. When IA current flows through the coil, determine flux density.
- 9. Derive an expression for energy stored in a magnetic field. 4
 - A circuit consists of series combination of elements as resistance of 6 Ω , inductance of 0.4 H and a variable capacitor across 100 V. 50 Hz supply

Calculate:

- value of capacitance at resonance
- (ii) voltage drop across capacitor
- (iii) Q-factor of the coil.

2 + 2 + 2

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USE SEPARATE ANSWER-BOOK TO ANSWER PART-II QUESTIONS.

PART - II

{ Marks : 35 }

GROUP - A

(Multiple Choice Type Questions)

Choose the correct alternatives for any five of the following:

 $5 \times 1 = 5$

- Avalance breakdown is primarily depend on the phenomenon of
 - Collision

Doping

lonization

- Recombination.
- Barrier potential of Si diode is
 - 0.3 V

0.7 V

0.4 V

- 0.2 V.
- The three terminals of a p-n-p transistor are
 - Emitter-Base-Drain
 - Source-Base-Drain
 - Anode-Cathode-Neutral
 - Emitter-Base-Collector.
- An n-type semiconductor is formed when which one of the following elements is doped in Si?
 - Aluminium

- Boron
- Phosphorous
- d) None of these.

HTTP://WWW.MAKAUT.COM HTTP://WWW.MAKAUT.COM CS/B Tech(N)/SEM-1/ES-101/2013-14 CS/B Tech(N)/SEM-1/ES-101/2013-14 A Bipolar Junction Transistor is a GROUP - C Voltage controlled device (Long Answer Type Questions) Current controlled device Power controlled device $2 \times 10 = 20$ Answer any two of the following. none of these Without a DC source, a clipper acts like a What is biasing? Rectifier Clamper 5. Demodulator. Chopper Draw the Circuit Diagram of self biased n-p-n transistor vii) A 10 Ω resistor is stretched to increase its leng double. Its resistance will now be and explain how bias stability is achieved in this case. 20 Q 40 Ω 10 Ω 5 Ω. 2 + 4 + 4Derive the stability factors of self bias. GROUP - B (Short Answer Type Questions) Compare the characteristics of transistors in CE, CC Answer any two of the following. $2 \times 5 =$ and CB mode. With the help of energy-band diagram, differentiate amor Draw and explain the Input and Output characteristics conductor, semi-conductor and insulator. Construct a circuit of a full wave bridge rectifier at of CE connection of transistors. 3. draw the DC output waveform. 5 + 3 + 2What is reverse saturation current? What do you mean by ripple? 4 +What is rectifier? 7 Derive relation between α and β of a transistor. 4. Explain bridge rectifier with relevant circuit diagram Find α and I_{β} of a transistor with $\beta = 49$ as $I_{\rm F} = 12 \, {\rm mA}$. 3 + and output waveform | Turn over 1251 (N) 7 1251 (N)

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