

Bihar Engineering University, Patna

B.Tech. 1st Semester Examination, 2023

Course: B.Tech.

Code: 100101

Subject: Basic Electrical Engineering

Time: 03 Hours

Full Marks: 70

Instructions:-

- (i) The marks are indicated in the right-hand margin.
 - (ii) There are NINE questions in this paper.
 - (iii) Attempt FIVE questions in all.
 - (iv) Question No. 1 is compulsory.
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Q.1 Answer the following Questions (any seven only):-

[2 x 7 = 14]

Q.2

- (a) Derive an expression for the current and impedance for a series R-L and R-C circuit excited by a Sinusoidally alternating voltage. Draw the Phasor diagrams. [7]
- (b) A series circuit consisting of a 10 Ω resistor, a 100 μF capacitor and a 10 mH inductor is driven by a 50 Hz ac. voltage source of maximum value 100 volts. Calculate the equivalent impedance, Current in the circuit and the phase angle. [7]

Q.3

- (a) A load resistance R_L Ω is connected across the source V_s with internal resistance R_{int} in series with source. Obtain the condition that the power transferred to load from source is maximum. [7]
- (b) A resistance R is connected in series with a parallel circuit comprising two resistances of 12 Ω and 8 Ω respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 20V. Calculate R. [7]

Q.4

- (a) With neat diagram explain the construction and principle of a single-phase transformer. What are the characteristics of an ideal transformer? [10]
- (b) Derive the emf equation of a transformer. [4]

Q.5

- (a) Draw a neat sketch of a DC generator and label the component parts. Name the material used for each component part. [10]
- (b) Explain the operating principle of Three phase Induction motor. [4]

Q.6

- (a) With neat diagrams, explain various types of fuses used in electrical wiring systems. [7]
- (b) Write a detailed note on Fuse and circuit breaker. [7]

Q.7

- (a) State and Explain Thevenin's Theorem for a DC Circuit. Write applications, advantages and limitations of Thevenin's Theorem. [10]
- (b) State Norton's theorem. [4]

Q.8 A three single phase balanced load connected in three phase three wires star form, with the help of phasor diagram, obtain the relationship between line and phase quantities of voltage and current. [14]

Q.9 Write short notes on any two of the following:- [7 x 2 = 14]

- (a) Batteries and its types and application
- (b) Losses in Transformer
- (c) Differences between Balanced, Unbalanced and Faulty Electrical Systems
- (d) Working and application of Synchronous generator