

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech S1,S2 (S) Examination September 2020 (2015 Scheme)

**Course Code: EE100****Course Name: BASICS OF ELECTRICAL ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

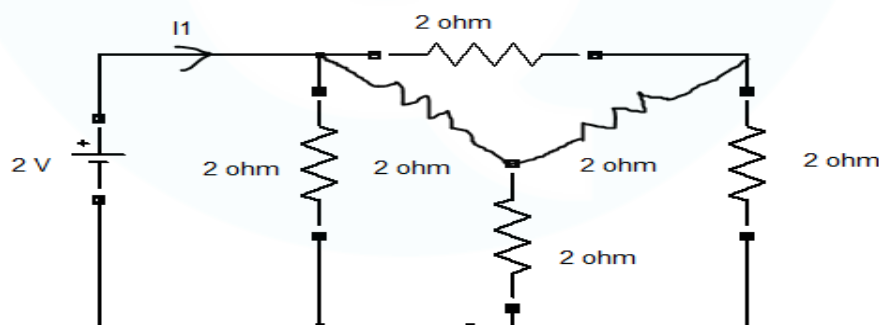
**PART A***Answer all questions, each carries 4 marks.*

Marks

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|----|---|-----|
| 1  | Draw and explain the V-I characteristics of ideal and actual current sources.         | (4) |
| 2  | Differentiate between statically induced emf and dynamically induced emf.             | (4) |
| 3  | What are the advantages of three phase system over single phase system?               | (4) |
| 4  | Define Active power, Reactive power and Apparent Power? Also draw the power triangle. | (4) |
| 5  | List the advantages and disadvantages of the thermal power plant.                     | (4) |
| 6  | Describe the working of solar photovoltaic energy conversion system.                  | (4) |
| 7  | Derive the emf equation of single phase transformer.                                  | (4) |
| 8  | Explain the working principle of DC generator.  | (4) |
| 9  | How do you make Single-Phase Induction Motor Self-Starting?                           | (4) |
| 10 | Compare squirrel cage induction motor with slip ring induction motor.                 | (4) |

**PART B****MODULE (1-4)***Answer any four questions, each carries 10 marks.*

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| 11 | Find current $I_1$ in figure by using Y - $\Delta$ transformation. | (10) |
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| 12 | An iron ring is made up of two different materials A and B and also has an air gap of 2mm. The relative permeability of A is 1000 and B is 1500 while their lengths are 75cm and 25 cm respectively. The cross sectional area of the core is $10\text{cm}^2$ . The magnetizing coil has 1000 turns and a current of 10A is allowed to flow through it. Calculate the i) the reluctance of part A, B and air gap ii) the flux in the air gap iii) mmf corresponding to each of the 3 parts. | (10) |
|----|--|------|

- 13 a) When a voltage of  $v=250 \sin (314t+\pi/3)$  is applied to a series RL circuit. The current drawn is  $i=25 \sin (314t+\pi/6)$ . Determine (i) power factor (ii) Active Power (iii) Impedance (iv) values of R and L (6)
- b) A three phase star connected load consists of three identical inductive coils of resistance  $50\Omega$  and inductance  $0.3H$ . The supply voltage is  $415V$ ,  $50$  Hz. Calculate (i) phase current (ii) line current (iii) power factor (iv) total power consumed (4)
- 14 a) Derive the RMS and average values of a purely sinusoidal voltage waveform (6)
- b) Two wattmeters W1 and W2 are connected to measure the total power in a three phase balanced circuit. One wattmeter reads  $3600W$  while the second reads backwards. On reversing the connections of the second wattmeter it is found to read  $400W$ . Determine the total power and power factor (4)
- 15 Draw a neat schematic diagram of a hydro-electric power plant and explain the functions of various components. (10)
- 16 Draw a neat schematic diagram of a Nuclear power plant and explain its operation. (10)

### MODULE 5

*Answer any one full question, each carries 10 marks.*

- 17 a) Explain the construction of single phase transformer. (5)
- b) Explain the working of single phase transformer. (5)
- 18 a) Draw the connection diagram of armature and field windings in shunt, series, and compound type DC motors. Write down the equation for field currents in terms of line and armature currents. (7)
- b) A dc motor connected to  $240V$  supply has an armature resistance of  $0.15\Omega$ . Calculate the armature current when back emf is  $213V$ . (3)

### MODULE 6

*Answer any one full question, each carries 10 marks.*

- 19 a) Describe the principle of operation of Split-Phase Induction Motor? (8)
- b) Why split-phase induction motors are most popular single-phase motors in the market? (2)
- 20 a) A 3- $\phi$  4 pole induction motor is supplied from  $3\phi$   $50Hz$  ac supply. Find (8)
- (i) synchronous speed
- (ii) rotor speed when slip is  $4\%$
- (iii) the rotor frequency when runs at  $600r.p.m.$
- b) Classify induction motor according to its rotor construction (2)