

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

**Course Code: EE100**

**Course Name: BASICS OF ELECTRICAL ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 4 marks.*

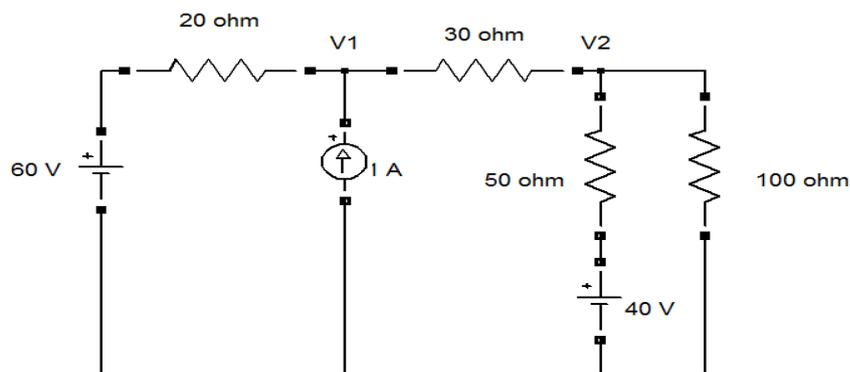
- |    |   | Marks |
|----|---|-------|
| 1  | Explain Kirchhoff's voltage and current law with example.   | (4)   |
| 2  | Compare electric and magnetic circuits.   | (4)   |
| 3  | Calculate the RMS and average values of a purely sinusoidal current having peak value 15A.  | (4)   |
| 4  | What is the phase angle relationship between applied ac voltage and circuit current in a purely inductive circuit? Prove your answer. | (4)   |
| 5  | What factors are taken in to account while selecting the site for thermal power plant?  | (4)   |
| 6  | Distinguish between primary transmission and secondary transmission.  | (4)   |
| 7  | Explain the principle of operation of single phase transformer.   | (4)   |
| 8  | What is back e.m.f. concerned with DC motors. Write the voltage equation representing back emf.                                       | (4)   |
| 9  | Calculate the speed of a 6 pole, 50Hz, 400V 3-phase induction motor when it is operating at a slip of 2%.                             | (4)   |
| 10 | With neat diagram, explain the working of split phase induction motor.  | (4)   |

**PART B**

**MODULE (1-4)**

*Answer any four questions, each carries 10 marks.*

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|----|---|------|
| 11 | Find current in 100 ohm resistor using node analysis. | (10) |
|----|---|------|



- 12 a) A ring shaped electromagnet has an air gap of 6mm and cross sectional area of  $12 \text{ cm}^2$ . The mean length of the core (excluding air gap) is 60cm. Calculate the mmf required to produce a flux density of  $0.4 \text{ Wb/m}^2$  in the gap. Take the relative permeability of the material as 400. (6)
- b) Derive the expression for energy stored in a magnetic field. (4)
- 13 A balanced three phase load consists of three coils each having resistance of  $4\Omega$  and inductance  $0.02\text{H}$ . It is connected to a  $415\text{V}$ ,  $50\text{Hz}$ , 3-phase ac supply. Determine the phase voltage, phase current, power factor and active power when the loads are connected in (i) star (ii) delta (10)
- 14 a) A  $220\text{V}$ ,  $50\text{Hz}$  single phase sinusoidal voltage produces a current of  $2.2\text{A}$  in a purely inductive coil. Determine (i) inductive reactance of the coil (ii) inductance (iii) power absorbed (iv) expression for applied voltage and current. (5)
- b) With the help of circuit diagram and phasor diagram derive the relation between line and phase voltages, and line and phase currents in a balanced delta connected system. (5)
- 15 Draw a neat schematic diagram of a Thermal power plant and explain its operation. (10)
- 16 Explain about any two types of available Non-conventional energy sources. (10)

### MODULE 5

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

- 17 a) Explain the construction and working of DC generator. (5)
- b) A four pole wave connected armature has 1000 conductors and flux per pole is  $0.05\text{wb}$ . Calculate the emf generated when the generator is running at a speed of  $1200\text{rpm}$ . (5)
- 18 A  $40 \text{ kVA}$  transformer has a core loss of  $450\text{W}$  and a full load copper loss of  $850\text{W}$ . If the power factor of the load is  $0.8$ , calculate (i) full load efficiency (ii) maximum efficiency (iii) the load at which maximum efficiency occurs. (10)

### MODULE 6

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

- 19 Explain the constructional details of squirrel cage and slip ring induction motor (10)
- 20 With suitable diagrams explain the principle of operation of a capacitor-start induction motor. Compare it with split-phase motor. Give one application. (10)

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