10022 **F**

Reg. No.:_____ Name: _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: EE100

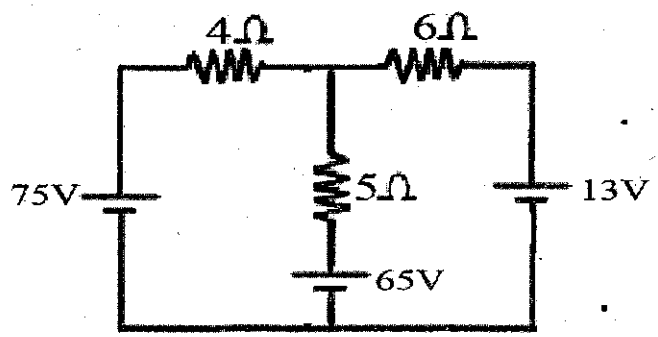
Course Name: BASICS OF ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

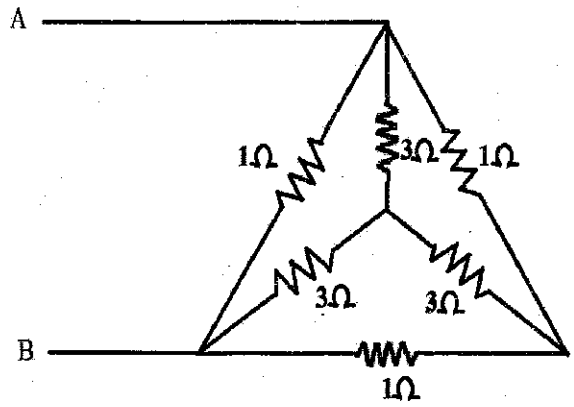
PART A

Answer all questions, each question carries 4 marks

1. Find the current through 5Ω resistor using Nodal analysis



2. Determine the equivalent resistance RAB using Star-Delta Transformation.



3. Differentiate between statically and dynamically induced emf.
4. Prove that the average power for a purely capacitive circuit is zero.
5. What are the advantages of three phase system over single phase system?
6. Give the reason for using high voltage in power transmission system.
7. What are the different types of losses in a transformer?
8. Single phase induction motor is not self-starting. Comment.
9. Draw the schematic layout of LT switch board.

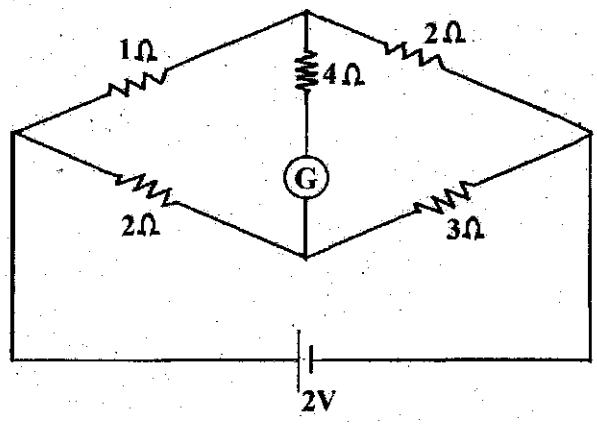
10. 'Earthing is necessary'. Comment on the statement.

(10 x 4 = 40 Marks)

PART B

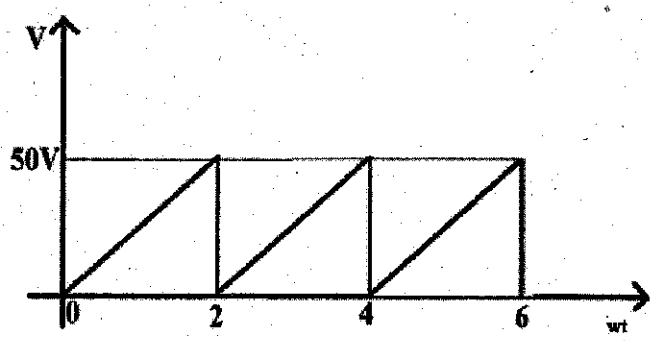
Answer any 4 FULL questions each having 10 marks

11. Calculate the current through the galvanometer (10)



12. A steel ring of 25cm diameter and of circular cross section 3cm in diameter has an air gap of 1.5mm length. It is wound uniformly with 750 turns of wire carrying a current of 2.1 A. Calculate (i) m.m.f (ii) flux density in air gap (iii) magnetic flux (iv) relative permeability of steel ring. Assume that iron path takes about 35% of total magnetomotive force. (10)

13. Determine the form factor of the saw tooth wave shown: (10)



14. Explain how power is measured in a three phase system using two wattmeters. (10)

15. With a neat schematic diagram, explain a hydroelectric power generation plant. (10)

16. With a neat diagram,explain a typical power transmission scheme. (10)

(4x10=40 Marks)

Answer any one FULL question having 10 marks

17. With neat sketch give the construction details of a DC machine? (10)

OR

18. a) A single phase transformer has a core whose cross-sectional area is 150 cm^2, operates at a maximum flux density of 1.1Wb/m^2 from a 50Hz supply. If the secondary winding has 66 turns, determine the output KVA when connected to a load of 4Ω impedance. Neglect any voltage drop in transformer. (5)

b) The power input to a 230V dc shunt motor is 8.477kW. The field resistance is 230Ω and armature resistance is 0.28Ω. Find input current, armature current and back emf. (5)

Answer any one FULL question having 10 marks

19. a) Discuss the different tariff scheme employed for LT and HT consumers. (5)

b) With neat diagram, explain pipe earthing in electrical installation. (5)

OR

20. Discuss the difference between ELCB and MCB with neat diagram. (10)

10025

F

Reg. No. : ..... Name : .....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016

EE100 BASICS OF ELECTRICAL ENGINEERING

Max. Marks : 100 Duration : 3 Hours

PART – A

Answer **all** questions, **each** question carries **4** marks :

1. State and explain Kirchhoff's laws.
2. What are constant voltage and constant current sources ? Voltage and current sources are mutually transferable. Explain. Derive the relationship between line and phase voltage in a star connected system.
3. Prove that in a purely inductive circuit the current lags behind the applied voltage by 90 degree and the power consumed is zero.
4. In the two wattmeter method of power measurement in a three phase circuit, the readings of the wattmeters are 4800W and – 400W. Find the total power and power factor of the load.
5. Draw and explain the typical electrical power transmission scheme.
6. Derive the e.m.f equation of a single phase transformer.
7. Explain the necessity of starter in a DC motor.
8. Compare the performance of incandescent, fluorescent, mercury vapour and metal halide lamps in terms of efficacy, colour rendering index and life.
9. Compare uniform tariff and differential tariff.
10. What are the different types of lamps available in the market ? Give the specifications of a typical lamp. What are the advantages of LED lamps ?

(10×4=40 Marks)

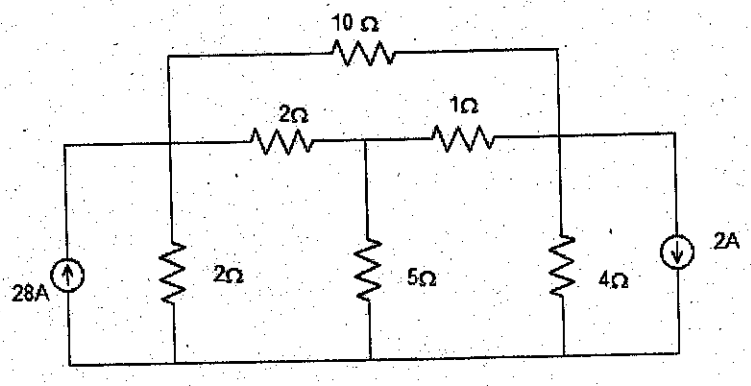
P.T.O.

PART – B

MODULE (1 – 4)

Answer **any four** questions, **each** question carries **10** marks :

11. Use nodal analysis to form network equations and solve the nodal voltages using matrix method. Also calculate the current in different branches. **(10)**



12. A steel ring of circular cross section of 1 cm in radius and having a mean circumference of 94.3 cm has an air gap of 1 mm long. It is uniformly wound with an exciting coil consisting of 600 turns and excited with a current of 2.5 A. Neglecting magnetic leakage

    Calculate :

    i) m.m.f

    ii) Magnetic flux

    iii) Reluctance

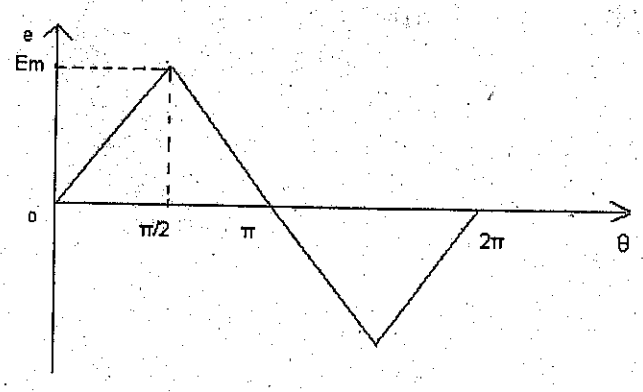
    iv) Flux density

    v) Relative permeability of steel.

    Assume that steel part takes about 40% of total ATs. **(10)**

13. a) Define the rms value and average value of an alternating quantity. **(4)**

    b) Find the rms value and average value of the given waveform. **(6)**



14. A Series R-C circuit takes a power of 7000W when connected to 200V, 50Hz supply. The voltage across the resistor is 130 V.

    Calculate :

    i) Resistance

    ii) Current

    iii) Power factor

    iv) Capacitance

    v) Impedance

    vi) Equations for instantaneous values of voltage and current. **(10)**

15. Explain the measurement of power in a three phase system by using two wattmeter with relevant phasor diagrams. **(10)**

16. With the help of block diagram explain the working of a Thermal power plant. **(10)**

(4×10=40 Marks)

MODULE – 5

Answer **any one full** question :

17. a) What are the losses of single phase transformer ? **(4)**

    b) A single phase transformer has 400 and 1000 primary and secondary turns respectively. The net cross sectional area of the core is 60 cm^2. If the primary winding be connected to a 50Hz supply at 500V,

    Calculate :

    i) Peak value of flux density in the core and

    ii) The voltage induced in the secondary winding. **(6)**

OR

18. a) Explain the working principle of a three phase Induction motor. **(5)**

    b) Calculate the generated e.m.f. in the armature winding of a 4 pole lap wound dc machine having 728 conductors running at 1800 rpm. The flux per pole is 30 mWb. **(5)**

MODULE – 6

Answer **any one** full question :

19. With a neat sketch explain pipe and plate earthing. **(10)**

OR

20. a) With a neat sketch explain the working of a single phase ELCB. **(5)**

    b) Draw the schematic layout of a typical LT distribution board used in house wiring. **(5)**

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10024

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2016

EE100 BASICS OF ELECTICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

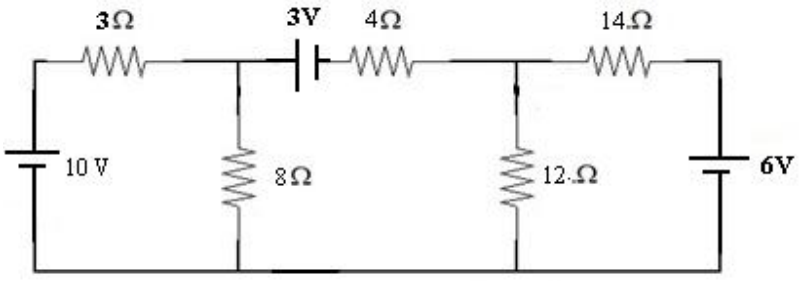
1. A 50 Ω resistor is in parallel with a 100 Ω resistor. Current in 50 Ω is 7.2A. What is the value of third resistance to be added in parallel to this circuit to make the total current 12.1 A.
2. Three resistors of 30Ω each are connected in delta. Obtain the equivalent star network.
3. Define MMF, magnetizing force, flux density, reluctance.
4. Define active, reactive & apparent power in an ac circuit with the help of power triangle.
5. Derive the relation between line and phase current in three phase delta connected system.
6. List the need for high voltage transmission system.
7. Explain the principle of operation of 3 phase induction motor.
8. Derive the emf equation of the transformer.
9. With neat sketch explain the working of fluorescent lamp.
10. Differentiate between simple and differential tariff.

PART B

MODULE (1-4)

Answer any four questions, each question carries 10 marks

11. a) State & Explain Kirchhoff's laws. (4)
    b) For the circuit shown below, find current through 8Ω and 12Ω resistors. (6)

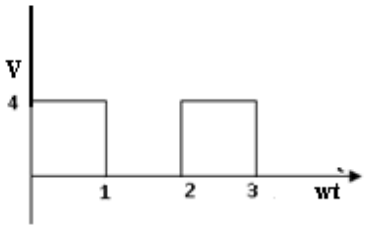


12. a) Compare electric and magnetic circuit. (6)

b) A coil of insulated wire 500 turns and of resistance 4Ω is closely wound on iron ring. The ring has a mean diameter of 0.25m and a uniform cross sectional area of 700mm^2. Calculate the total flux in the ring when a dc supply of 6V is applied to the end of the winding. Assume a relative permeability of 550. (4)

13. a)State and explain Faraday's laws and Lenz's law. (5)

b) Find the average and rms values for the given wave form. (5)



14. With neat phasor diagram, explain how power is measured in a 3 phase system by using 2 wattmeters. (10)

15. With a neat layout explain thermal power plant .Also list 4 advantages and disadvantages of hydel power plant. (10)

16. With the help of a single line diagram explain a typical power transmission system. (10)

MODULE 5

Answer any one full question

17. a) With neat diagram explain the construction of a dc generator. (5)

b) Maximum efficiency of a transformer occurs at unity power factor and at full load. If the full load copper loss is 60 W, calculate the total loss at full load, $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{3}{4}$ full load? (5)

OR

18. a) List 4 advantages of three phase transformers compared to single phase transformer (4)

b) Explain different types of dc generators with respect to excitation and winding connection (6)

MODULE 6

Answer any one full question

19. What is the necessity of earthing. Explain with neat diagram, pipe earthing. (10)

OR

20. a) With neat diagram explain the working of mercury vapour lamp. (6)

b) "LED lamps are preferred now a days" give 4 reasons supporting this statement. (4)

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10023

Reg. No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPT 2016

EE100 BASICS OF ELECTICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

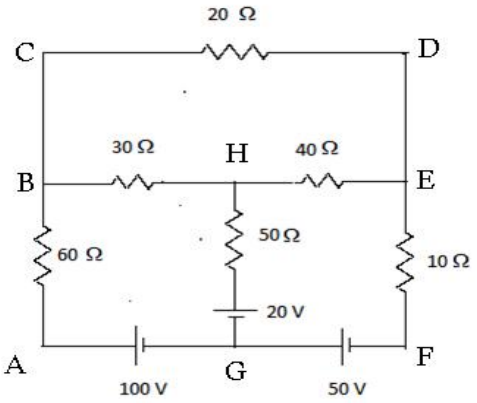
1. State and explain Kirchhoffs law.
2. Three resistors R_1=20 Ω, R_2=90Ω and R_3=10 Ω are connected in star .Obtain the equivalent delta circuit.
3. Define coefficient of coupling in a magnetic circuit.
4. A 10Ω resistor & 400μF capacitor are connected in series to a 240V sinusoidal ac supply. The circuit current is 5A. Calculate the supply frequency & phase angle between current & voltage.
5. Explain the advantage of three phase system compared to single phase system.
6. Draw the single line diagram of a typical power transmission scheme.
7. Derive E.M.F. equation of a Transformer.
8. Explain the principle of operation of Universal motor.
9. Draw the schematic diagram of LT switch board.
10. Explain the working of MCB and ELCB

PART B

MODULE (1-4)

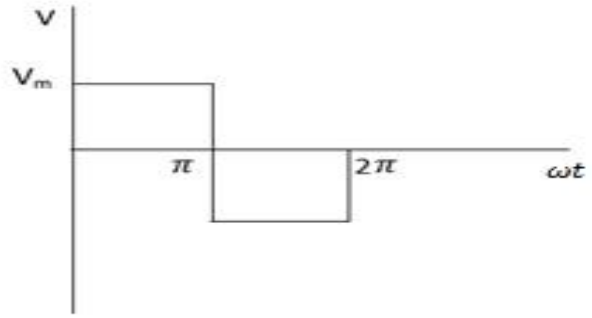
Answer any four questions, each question carries 10 marks

11. Calculate the current in each branch of the circuit shown using mesh analysis (10)



12. a) An iron ring of mean length 50cm has an air gap of 1mm and a winding of 200 turns. If the relative permeability of iron is 300 when a current of 1A flows through the coil, find flux density. Take permeability of air as $4\pi \times 10^{-7}$ H/m. (5)
b) Compare magnetic circuit and electric circuit. (5)

13. a) Determine average value & rms value of symmetrical square wave also find the form factor (6)



b) Distinguish between self inductance and mutual inductance (4)

14. Three identical resistors of 20Ω each are connected in star to 415V, 50Hz three phase supply. Calculate (i) the total power consumed, (ii) total power consumed if they are connected in delta (iii) total power consumed, if one of the resistors is opened in both star connection and delta connections. (10)

15. With a neat schematic diagram explain Thermal power plant. (10)
16. Explain in detail the different equipment used in a substation. (10)

MODULE 5

Answer any one full question

17. The iron loss of 230/115V, 5KVA transformer is 200W.The copper loss at full load is 250W. Find efficiency of the transformer when delivering
(i) full load power at unity power factor. (5)
(ii) half full load power at 0.8 pf lagging. (5)

OR

18. Explain with neat diagram the construction and working principle of three phase induction motor. (10)

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MODULE 6

Answer any one full question

19. a). Explain the necessity of earthing in electrical installation (4)

b) With a neat sketch, explain the method of Plate Earthing (6)

OR

20. With the help of a diagram explain the principle of operation of compact fluorescent lamp and sodium vapour lamp.

(10)

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Reg. No_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2017

EE100: BASICS OF ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks

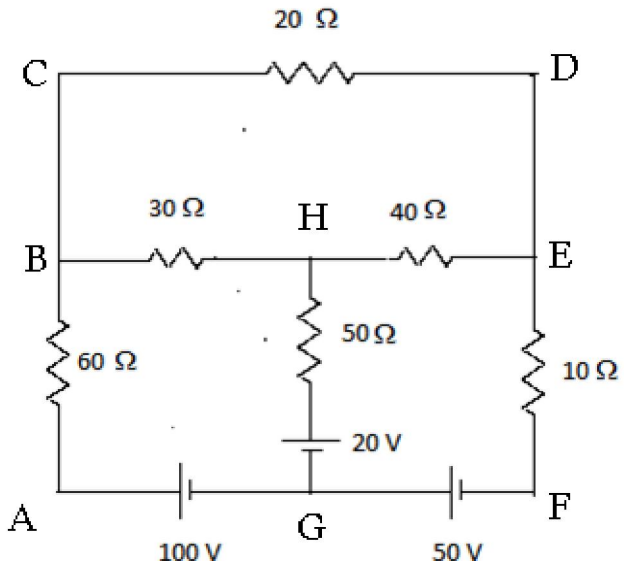
1. State and explain Kirchhoff's laws.
2. Three resistors R_1= 30 Ω, R_2 = 60 Ω, and R_3 =10 Ω are connected in star. Obtain the equivalent delta circuit.
3. Explain Faraday's laws of electromagnetic induction and Lenz's laws.
4. A10 Ω resistor and 300 mH inductor are connected in series to a 230V sinusoidal supply. The circuit current is 4A. Calculate the supply frequency and phase angle between current and voltage.
5. Deduce the relationship between line and phase voltage in a star connected system.
6. Draw and explain a typical electrical power transmission scheme.
7. Explain the working principle of a DC motor.
8. What are the losses occurring in a transformer. Explain
9. Explain the working principle of a 3 phase induction motor.
10. Why a single phase induction motor is not self-starting. Explain.

PART B

MODULE (1-4)

Answer any four questions, each question carries 10 marks

11. Calculate the current in each branch of the following circuit using mesh analysis. (10)



12. Asteel ring of circular cross section of 1 cm in radius and having a mean circumference of 94.3 cm has an airgap of 1 mm long. It is uniformly wound with an exciting coil consisting of 600 turns and excited with a current of 2.5 A. Neglecting magnetic leakage calculate (i) m.m.f. (ii) Reluctance (iii) Magnetic flux (iv) Flux density (v) Relative permeability of steel. Assume that steel part takes about 40% of total ATs. (10)
13. a) Define peak factor and form factor of an alternating quantity. (4)
    b) Derive the rms and average value of a sinusoidal waveform. (6)
14. Three inductive coils, each with a resistance of 22 Ω and an inductance of .05 H are connected in (i) in star and (ii) in delta, to a three phase 415 V, 50 Hz supply. Calculate for each of the above case (i) phase current and line current and (ii) total power absorbed. (10)
15. With a neat schematic diagram, explain the working of a nuclear power plant. List any three advantages and any three disadvantages of a nuclear power plant. (10)
16. Explain about any two types of non - conventional energy sources available. (10)

MODULE 5

Answer any one full question

17. a) Derive an expression for back emf of a d.c. motor. (6)
    b) A single phase transformer is to have a voltage rating of 3300/240V. Find the number of turns in the primary and the secondary if the frequency of operation is 50Hz. The maximum flux in the core may be taken as 0.04 Wb. (4)

OR

18. a) Explain different types of dc motors with respect to excitation and winding connection. (6)
    b) A 220V dc series motor draws a current of 20A. The armature resistance is 0.1Ω and series winding resistance is 1.2Ω. Find the back emf. (4)

MODULE 6

Answer any one full question

19. a) Compare squirrel cage induction motor with slip ring induction motor. (4)
    b) Explain any two starting methods used to start a single phase induction motor. (6)

OR

20. a) A four pole, three phase induction motor runs at 1440 rpm at rated load. Calculate the percentage slip. Supply frequency is 50 Hz. (4)
    b) Explain the constructional details and working principle of a single phase induction motor. (6)

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Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

Course Code**: EE100**

Course Name**: BASICS OF ELECTRICAL ENGINEERING**

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks.

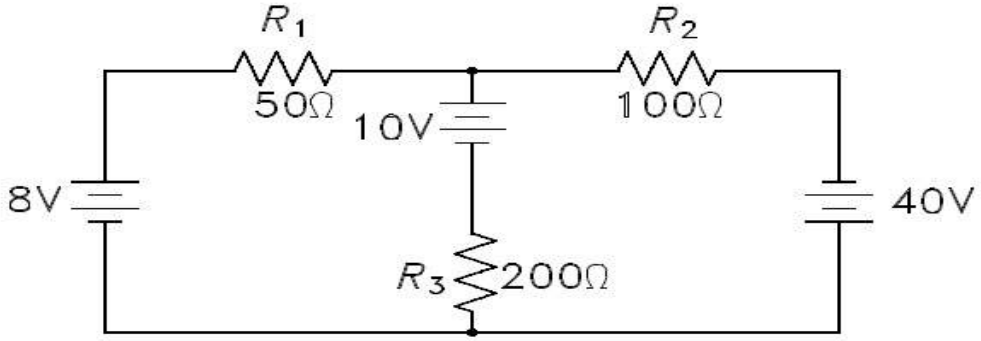
1. A resistor of 5 Ω is connected in parallel with a resistor of R_1 Ω. This combination is connected in series with an unknown resistor of R_2 Ω and the complete circuit is then connected to 50 V dc supply. Calculate the values of R_1 and R_2, if the power dissipated by the unknown resistor R_1 is 150 W with 5A passing through it.
2. Derive an expression for energy stored in a magnetic circuit.
3. What are the advantages of three phase systems?
4. Derive an expression for three phase power in a star connected system.
5. What are the advantages of renewable sources?
6. What are the advantages of high voltage transmission?
7. What are the losses in a transformer? How these losses can be reduced?
8. With the help of diagrams, explain how dc motors are classified.
9. Define synchronous speed and slip of a three phase induction motor.
10. Explain the constructional details of a single phase induction motor.

PART B

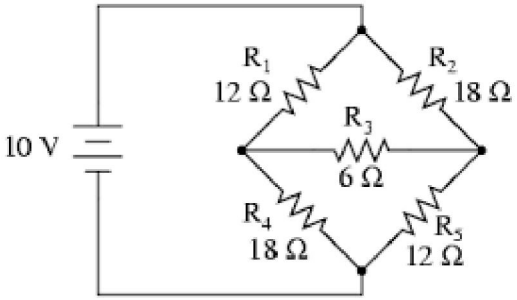
MODULE (1-4)

Answer any four questions, each question carries 10 marks

11. a. Determine the power dissipated in all the three resistors in the following figure using mesh current analysis. (5)



b. Determine the current drawn from the supply using start delta conversion. (5)



12. a. A steel ring of 20 cm^2 cross-section having a mean diameter of 50 cm is wound uniformly with 500 turns. Flux density of 1.0 Wb/ m^2 is produced by 4000 ampere turns per metre. Calculate (i) the inductance (ii) the exciting current and (iii) the inductance when a gap of 1 mm long is cut in the ring, the flux density being 1.0 Wb/ m^2. Neglect leakage and fringing. (7)

b. A conductor of length 0.5 m moves in a uniform magnetic field of density 1.1 T at a velocity of 30 m/s. Calculate the induced voltage in the conductor when the direction of motion is inclined at 60^0 to the direction of the field. (3)

13. a. Derive the form factor of a pure sinusoidal wave form. (5)

b. An alternating voltage of (80 + j60) V is applied to a circuit and the current flowing is (-4 + j10) A. Find (i) the impedance of the circuit, (b) the power consumed and (c) the phase angle. (5)

14. a. Each phase of a delta connected load has a resistance of 25 Ω and an inductance of 0.15 H. The load is connected across a 400 V, 50 Hz, three phase supply. Determine the line current, power factor and power consumed. (5)

b. A balanced three phase star connected load is connected across a 400 V three phase ac supply. Power consumed by the load is measured using two wattmeter method. The readings of the two wattmeters are -500 W and 1500 W. Find the current drawn from the supply and the power factor of the load. (5)

15. With the help of a neat diagram, explain the working of a thermal power plant. (10)

16. a. With the help of a diagram, explain a power transmission scheme. (5)

b. What are the equipments in a substation? Explain the function of each equipment. (5)

MODULE 5

Answer any one full question

17. a. What are the parts of a dc generator? Explain each part. (5)

b. A 150 kVA transformer has an iron loss of 700 W and a full load copper loss of 1800 W. Calculate the efficiency at full load, 0.8 power factor lagging. (5)

OR

18. a. A 120 V dc shunt motor draws a current of 200 A. The armature resistance is 0.02 Ω and shunt field resistance 30 Ω. Find the back emf. (5)

b. A 30 kVA, single phase transformer has 500 primary turns and 30 secondary turns. The primary is connected to a 3300V, 50 Hz supply. Calculate (i) the maximum flux in the core, (ii) the secondary emf , (iii) the primary and secondary currents. (5)

MODULE 6

Answer any one full question

19. a. How does a three phase induction motor start? (5)

b. What are the different types of three phase induction motors? What are their advantages and disadvantages? (5)

OR

20. a. The frequency of the emf in the stator of a 4 pole induction motor is 50 Hz, and that in the rotor is 1.5 Hz. What is the slip and at what speed is the motor running? (5)

b. Why a single phase induction motor is not self starting? How it can be made self starting? (5)

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Total Pages: 2

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code: EE100

Course Name: BASICS OF ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks.

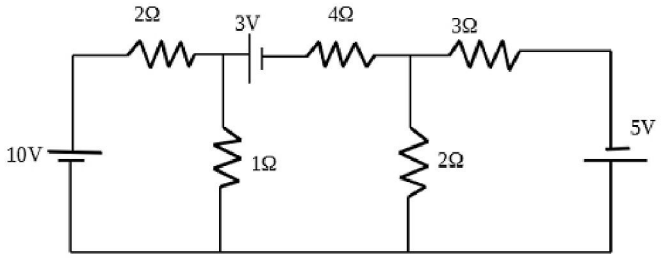
1	Distinguish between an ideal voltage source and a practical voltage source.	(4)
2	State Kirchhoff's laws.	(4)
3	Compare electric and magnetic circuits.	(4)
4	What are the advantages of three phase systems?	(4)
5	A resistance of 10Ω and an inductive reactance of 10Ω are connected in series. Calculate the value of impedance and draw the impedance triangle.	(4)
6	What are the advantages of high voltage transmission?	(4)
7	Mention the different losses in a transformer. How these losses can be reduced?	(4)
8	A 220 V dc shunt motor draws a current of 50A. The armature resistance is 0.2Ω and shunt field resistance is 40Ω. Calculate back emf.	(4)
9	Explain the principle of working of three phase induction motor.	(4)
10	Why single-phase induction motor is not self-starting.	(4)

PART B

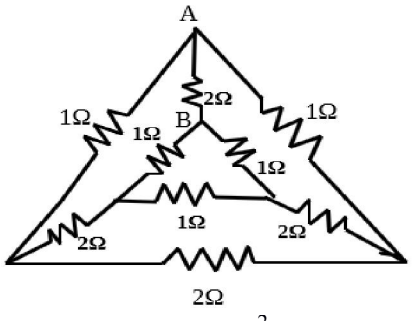
MODULE (1-4)

Answer any four questions, each carries 10 marks.

11 a) Calculate the power dissipated in 1Ω resistor in the following figure using node voltage method. (6)



b) Using star delta conversion, calculate the effective resistance between A and B of the following figure. (4)



12 a) An iron ring 15 cm mean diameter and 10 cm^2 in cross-section is wound with 200 (6)

turns of wire. For a flux density of 1 Wb/m^2 and a relative permeability of 500, calculate the exciting current, inductance and energy stored when there is 2mm air gap.

b) Derive an expression for the energy stored in a magnetic field. (4)

13 a) Define form factor. Also derive the form factor of a pure sinusoidal waveform. (5)

b) A series RC circuit takes a power of 7000W when connected to 200V, 50Hz supply. The voltage across the resistor is 130V. Calculate: - (5)

i) Resistance ii) Power factor iii) Current

iv) Capacitance v) Impedance of the circuit.

14 a) Explain the method for three phase power measurement in a star connected system using two wattmeter method with necessary diagrams. (5)

b) A balanced star connected load of (8+j6) Ω per phase is connected to a three-phase 230V supply. Find the line current, power factor and power consumed by the load. (5)

15 Explain the working of a thermal power plant with the help of a neat block diagram. (10)

16 a) Draw the layout of a typical electrical power transmission scheme. (5)

b) Write short note on the equipments used in a substation. (5)

MODULE 5

Answer any one full question.

17 a) Explain different types of dc motors. Give one application of each. (5)

b) A 150 KVA single phase transformer has an iron loss of 750W and full load copper loss of 2000W. Calculate the efficiency at half load, 0.8 power factor lagging. (5)

OR

18 a) Derive the emf equation of a transformer. (5)

b) A 25 KVA single phase transformer has 600 primary and 1200 secondary turns. The net cross-sectional area of the core is 50 cm^2. If the primary winding is connected to a 230V 50Hz supply. Calculate: - (5)

i) Secondary emf ii) Maximum flux density in the core

iii) Full-load primary and secondary currents.

MODULE 6

Answer any one full question.

19 a) What are the different types of three phase induction motors? What are their advantages and disadvantages. (5)

b) A 4 pole, 50Hz squirrel-cage induction motor runs at a speed of 970 rpm. Calculate: - (5)

i) Slip ii) Frequency of induced current in the rotor.

OR

20 a) Write short note on the following: - (10)

i) Split phase induction motor and

ii) Capacitor start induction motor

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Total Pages: 2

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

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

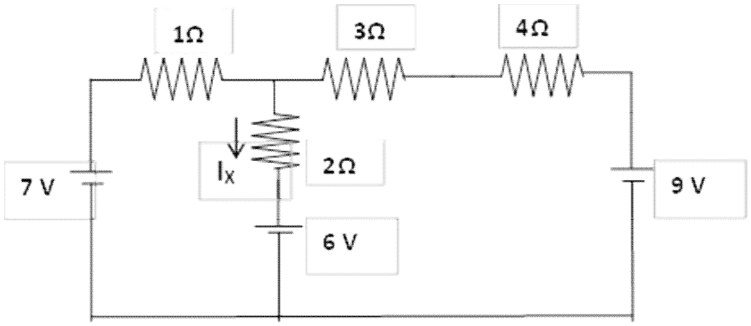
1		Differentiate between Constant voltage and constant current sources.	(4)
2		Compare electric and magnetic circuits.	(4)
3		Derive the expression for RMS value of a sinusoidal waveform.	(4)
4		Write the expression for three phase power in a delta connected system.	(4)
5		What are the advantages of a hydroelectric power plant?	(4)
6		Explain the working principle of a photovoltaic cell.	(4)
7		Explain the working principle of a DC motor.	(4)
8		Derive the emf equation of a transformer.	(4)
9		Define and write the expression for slip of a 3 phase induction motor.	(4)
10		Explain the working of a capacitor start single phase induction motor.	(4)

PART B

MODULE (1-4)

Answer any four questions, each carries 10 marks

11	a)	Solve the following circuit using mesh analysis and find i_x	(5)



	b)	With a sample circuit, explain the step by step procedure of nodal analysis.	(5)
12	a)	State and explain Faraday's laws of electromagnetic induction.	(5)
	b)	With suitable example, explain statically and dynamically induced emf.	(5)
13	a)	Define and obtain the expression for power factor, active power, reactive power and apparent power of a series RLC circuit.	(5)
	b)	A 50Ω resistor in series with 120μF capacitor is connected to 230V 50Hz supply. Find i) impedance ii) current iii) power factor iv) voltage across the resistor v) voltage across the capacitor.	(5)
14	a)	Explain the 2 wattmeter method of power measurement using the circuit arrangement.	(5)
	b)	A 3 phase 4 wire 400V system feeds three loads 10- j8Ω each connected in star.	(5)

Calculate the line currents in each phase.

15 With the help of a neat diagram, explain the working of a nuclear power plant. (10)

16 a) Explain the need for high voltage transmission. (5)

b) Explain the principle and operation of circuit breaker used in substation. (5)

MODULE 5

Answer any one full question

17 a) Explain different types of dc generators with suitable circuit diagrams and obtain voltage and current expressions of each. (7)

b) The maximum value of flux density in the core of a 250/3000V, 50Hz single phase transformer is 1.5Wb/m2. If the emf /turn is 8V, determine i) primary and secondary number of turns ii) area of the core. (3)

OR

18 a) Draw and explain the constructional details of 3 phase transformers. (5)

b) A 220V DC shunt motor takes 30A at full load. Find the back emf developed if the armature and shunt field resistances are 0.5Ω and 110Ω respectively. (5)

MODULE 6

Answer any one full question

19 a) Draw and explain the constructional details of a 3 phase squirrel cage induction motor. (5)

b) A 6 pole 3phase induction motor operates from a supply whose frequency is 50Hz. Calculate (5)

i) The speed at which the magnetic field of the stator is rotating.

ii) The speed of the rotor when the slip is 0.03

OR

20 a) Explain why single phase induction motors are not self-starting. (5)

b) Draw and explain the constructional features of a three phase induction motor. (5)

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Reg No.:..... Name:.....

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EE100

Course Name: BASICS OF ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks.

			Marks
1	a)	What is the difference between current source and voltage source?	(2)
	b)	Draw the VI or IV characteristics of ideal & practical voltage and current sources.	(2)
2	a)	How much more current can be safely drawn from a 120 V outlet fused at 15 A, if a 600 W curling iron and a 1200W hair dryer are already operating in the circuit?	(2)
	b)	A certain light bulb with a resistance of 95 Ω is labelled *'150 W'*. Was this bulb designed for use in a 120V circuit or a 220V circuit? Justify your answer.	(2)
3	a)	An ideal mutual inductor is made from a primary coil of inductance 5mH and a secondary coil of inductance 10mH.Find the value of the mutual Inductance.	(2)
	b)	A DC source of 20V is applied to a series combination of a 5kΩ resistor and a 4mH inductor. Find the equilibrium value of the energy stored in the magnetic field.	(2)
4		Derive the relation between line current and phase current when a balanced 3-phase three wire supply is fed to a 3-phase delta connected pure resistive load (R Ω of equal value connected in each arm).	(4)
5	a)	Define renewable energy.	(1)
	b)	Enumerate major types of geothermal renewable energy resources.	(3)
6		What do you mean by distribution system? How feeder is different from distributor?	(4)
7		Derive the emf equation of transformer.	(4)
8		What is the principle of operation of a DC motor? What are the constructional differences between series and shunt field windings?	(4)
9		Distinguish between squirrel cage and slip ring rotors of 3-phase induction motor.	(4)
10		Compare three-phase and single-phase induction motors.	(4)

PART B

MODULE (1-4)

Answer any four questions, each question carries 10 marks.

11	a)	Obtain the voltage drops across all resistor of the circuit shown in Fig. 1 using nodal analysis. All the values of the resistances are in Ω.	(6)

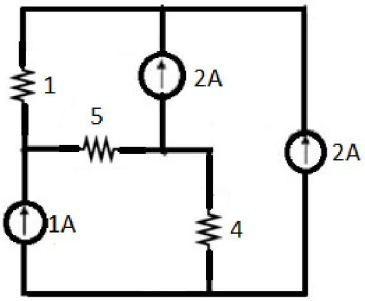

Figure 1.

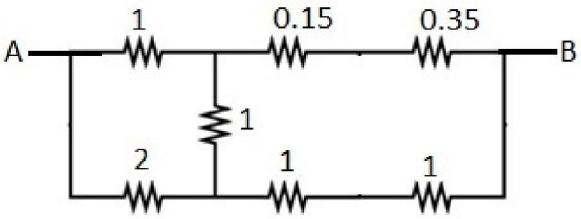

Figure 2.

b) Use star-delta/ delta- star transformation to determine the equivalent resistance between the points A and B of the circuit shown in Fig. 2. All the values of the resistances are in Ω. (4)

12 a) A closed magnetic circuit of cast steel contains a 6cm long path of cross-sectional area 1 $cm^2$and a 2cm path of cross-sectional area 0.5 cm^2. A coil of 200 turns is wound around the 6 cm length of the circuit and a current of 0.4 A flows through it. Determine the flux density in the 2 cm path of the magnetic circuit. Relative permeability of cast steel is 750. (6)

b) Derive an expression for dynamically induced emfin a moving conductor in terms of magnetic flux density (B), length of the conductor(l), velocity(v) and the angle between B and v (4)

13 a) Tabulate thesimilarities and dissimilarities of electrical circuits and magnetic circuits (6)

b) A hollow air cored inductor coil consists of 500 turns of copper wire which produces a magnetic flux of 10mWb when passing a DC current of 10 A. (4)
(i) Calculate the self-inductance of the coil in mH.
(ii) calculate the value of the self-induced emf produced in the same coil after a time of 10ms.

14 a) Find the total voltage across the terminals A and B of the circuit shown in Fig. 3. Draw the waveforms of the voltages $3\angle 0^\circ$, $4\angle 180^\circ$ and V_{AB}. (3)

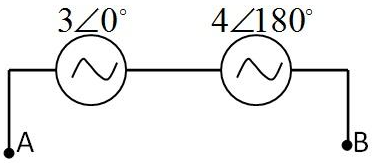

Figure 3.

b) A series circuit consisting of a capacitor of 2 μF and a resistance of 500 Ω. An AC source is connected to the circuit which draws a current of $50\angle 0$ mA. The angular frequency of AC source is 400π.(i) draw the circuit and find the source voltage (ii) find the voltage across the capacitor and resistor (iii)draw the voltage phasor diagram. (7)

15 a) A three-phase load consumes 100 kW, and 50 kVAR. Determine the apparent power and the power factor angle. (2)

b) A star connected balanced three phase load of (10+j10) Ω is supplied from a star connected balanced three phase supply with $V_{AB} = 100\sqrt{3}\angle 0°$ V. Two single phase wattmeters are connected to measure three phase power. (8)
Determine: -i) Wattmeter readings of W_A and $W_c$ii) Three phase real power
iii) Three phase reactive power

16 With neat sketches, describe the main components of a nuclear power plant. (10)

MODULE 5

Answer any one full question, carries 10 marks.

17 a) How back emf is generated in a DC motor? What is the significance of back emf? (3)

b) With electrical circuit diagram, give detailed description of various types of DC motors. Elaborate the characteristics of each type. (7)

OR

18 a) A 200 kVA rated transformer has a full-load copper loss of 1.5 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load and 0.85 power factor. (6)

b) How hysteresis and eddy current losses are minimized in a transformer? (4)

MODULE 6

Answer any one full question, carries 10 marks.

19 a) Define the terms: (4)
i) synchronous speed ii) slipiii) slip speediv) rotor speed.

b) A 3-phase 50Hz induction motor has a full load speed of 960 rpm. Find the: (6)
i) Slip
ii)Number of poles
iii)Frequency of rotor induced emf
iv) Speed of rotor field with respect to rotor
v) Speed of rotor field with respect to stator
vi) Speed of rotor field with respect to stator field.

OR

20 a) List out any four types of single phase induction motors. (2)

b) Write down the constructional details and working of capacitor start induction motor. Draw relevant phasor diagram. (8)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 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 State Kirchhoff's Current Law. Illustrate with a simple example. (4)

2 What is magneto motive force (MMF)? Explain MMF and field strength. (4)

3 What is the difference between Time period and frequency of a periodic wave form? How are they related? (4)

4 Describe any one method of connection used in a 3-phase circuit and write the relation for current and voltage. (4)

5 Distinguish between feeder, distributor and service mains in a secondary distribution system. (4)

6 Why high voltage is used for electric power transmission? (4)

7 Derive the EMF equation of DC generator. (4)

8 Give the constructional details of a core type 3-phase transformer. (4)

9 Compare a Squirrel cage induction motor with a slip ring induction motor. (4)

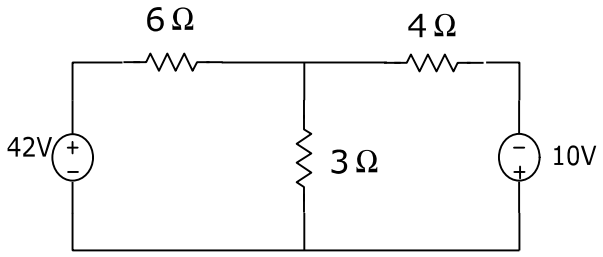
10 Draw and explain the Torque –Slip Characteristics of a 3-phase induction motor. (4)

PART B

MODULE (1-4)

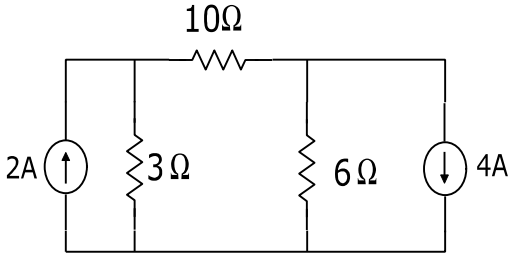
Answer any four questions, each carries 10 marks

11 a) By Mesh Analysis find the currents flowing through 4 Ω and 3 Ω resistors in the following network (7)

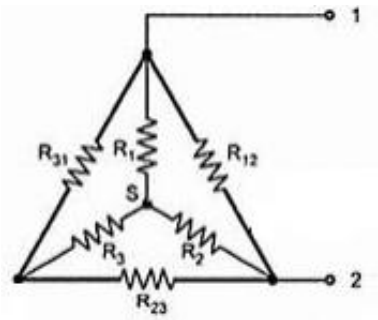


b) Differentiate Real and Ideal Voltage sources with the help of graphs (3)

12 a) For the given network find the current through the resistor 3 Ω. (6)



b) Find the equivalent resistance between the terminals 1 and 2, for the given circuit. Take $R_1 = R_2 = R_3 = 3\Omega$ and $R_{12} = R_{31} = R_{23} = 5\Omega$. (4)



13 a) A coil consists of 750 turns and a current of 10 A in the coil produces a magnetic flux of 1.2 mwb. Calculate the inductance of the coil. If the current in the coil is reversed in 0.01 seconds,find the average emf induced in the coil. (5)

b) Derive the expressions for self-inductance and mutual-inductance. (5)

14 a) Derive the expressions for RMS value, Average value and Form factor of a sinusoidal waveform. (7)

b) Draw the phasor diagram for a series RL circuit and give the expression for Impedance. (3)

15 a) A balanced Y connected load of 8+j6 Ω per phase is connected to a 3 phase, 400 V supply. Find the line current, Power factor, Active Power, Apparent power and Reactive Power. (5)

b) How power is measured in a 3-phase system using 2 wattmeters? Give the Connection diagram, Phasor diagram and necessary expressions. (5)

16 With the help of a neat schematic diagram explain the working of a Hydroelectric Power Plant. (10)

MODULE 5

Answer any one full question

17 a) A 4 pole,250 V DC series motor has a wave connected armature with 1254 conductors. The flux per pole is 22 mwb when the motor is taking 50 A. Armature resistance is 0.2 ohms and series field resistance 0.2 ohms. Calculate the speed. (5)

b) Give the classification of DC generators with necessary diagrams (5)

OR

18 In a 25 KVA, 3300/230V single phase transformer, the iron and full load Copper losses are 350 and 400 watts respectively. Calculate the efficiency at half full load,0.8 pf. (10)

MODULE 6

Answer any one full question

19 Why a single-phase induction motor is not self-starting? Give a detailed description of any two methods for starting asingle-phase induction motor. (10)

OR

20 a) Describe briefly the principle of operation of a 3-phase induction motor. (4)

b) Define Synchronous speed and slip with respect to an Induction motor (3)

c) A 3-phase Induction motor has 6 poles. It is connected to 3 phase, 400Volts, 50 Hz supply. The motor is operating at 5% slip. What is the speed of the motor. (3)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

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

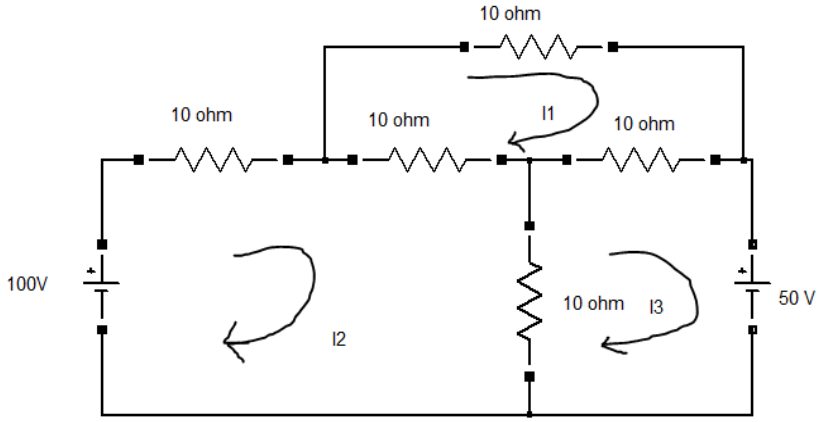
1	Explain Kirchhoff's voltage and current law with an example.	(4)
2	Define i) magnetic field intensity ii) flux iii) flux density iv) reluctance.	(4)
3	Define the following terms (i) RMS value (ii) Average value (iii) Frequency (iv) Time Period	(4)
4	In a single phase ac circuit consisting of an impedance of 10Ω, the RMS value of applied voltage is 230V. i) Write down the expression for instantaneous voltage ii) If the current lags the applied voltage by 30° write down the expression for instantaneous current iii) Calculate the power consumed in the circuit	(4)
5	Discuss the merits and demerits of hydro- electric power plant.	(4)
6	What are the environmental impacts of geothermal energy?	(4)
7	Explain the working principle of DC generator.	(4)
8	Explain the constructional details of core type transformer.	(4)
9	Explain the constructional details of the split phase induction motor.	(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.

11	Find mesh currents in the figure shown by mesh analysis	(10)



12 A steel ring of 25 cm diameter and of circular section 3 cm in diameter has an air gap of 1.5mm length. It is uniformly wound with 1000 turns of wire carrying a current of 2A. Calculate i) magnetomotive force ii) magnetic flux density in air gap iii) magnetic flux iv) relative permeability of steel ring. Assume that iron path takes about 40% of the total mmf. (10)

13 a) With the help of diagrams explain how an alternating voltage is generated using a single turn coil. (5)

b) A resistance of 5 Ω and an inductor of 15mH are connected in series across a 230V 50Hz single phase ac supply. Calculate the (i) current (ii) power factor (iii) power consumed (iv) What value of capacitor must be connected in series with this combination so as to improve the power factor to 0.9. (5)

14 A balanced three phase load consists of three coils each having resistance of 4Ω and inductance 0.02H. It is connected to a 415V, 50Hz, 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)

15 Draw a neat schematic diagram of a hydro-electric power plant and explain the functions of various components. (10)

16 Explain any two types of available non-conventional energy sources. (10)

MODULE 5

Answer any one full question, each carries 10 marks.

17 a) Derive the emf equation of a DC generator. (4)

b) With connection diagram , explain the different types of DC generators based on the type of field excitation given. (6)

18 a) What are the different types of losses occurring in a transformer? (2)

b) Write the expression for efficiency of a transformer. (2)

c) A single phase transformer has 400 primary turns and 1200 secondary turns. Primary winding is connected with 500V,50Hz supply. Find the flux density in the core and emf induced in the secondary winding. Cross sectional area of the core is 50cm^2. (6)

Also calculate the turns ratio of the transformer.

MODULE 6

Answer any one full question, each carries 10 marks.

19 a) Why a single phase induction motor is not self starting? (4)

b) How can we make a single phase induction motor self starting? Name the different types of single phase motors available based on starting methods? (6)

20 a) (8)

A 3-φ 4 pole induction motor is supplied from 3φ 50Hz ac supply. Find
(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)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

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

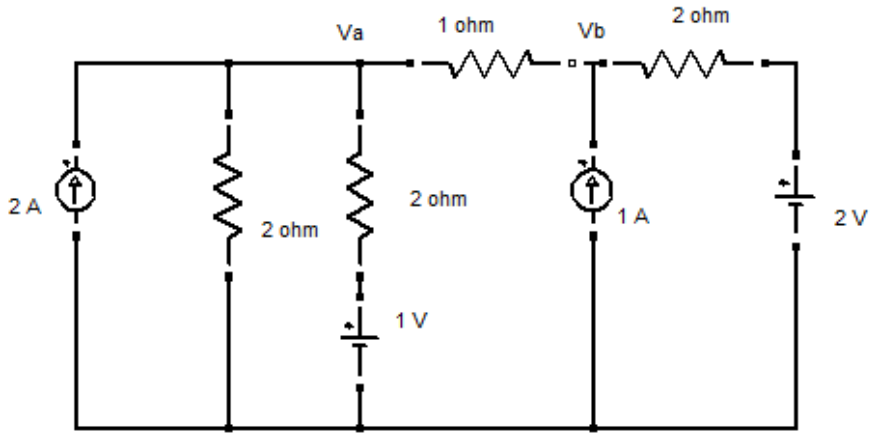
1	Draw and explain the V-I characteristics of ideal and actual voltage sources.	(4)
2	State and explain Faradays laws of electromagnetic induction.	(4)
3	Draw the phasor diagram showing all voltages and currents for the following ac circuits (i) series RL circuit (ii) series RC circuit	(4)
4	An alternating voltage of 100V is applied across a series RL circuit. If the voltage across the resistor is 70Ω find (i) voltage across the inductor (ii) power factor	(4)
5	Explain the general factors which influence the choice of site for hydroelectric power plants.	(4)
6	List the advantages and disadvantages of high voltage transmission.	(4)
7	Derive the EMF equation of a DC generator. Mention all the variables in it.	(4)
8	What are the losses occurring in a transformer. How they can be eliminated or minimised.	(4)
9	The frequency of e.m.f. in the stator of a 4-pole, 3-phase induction motor is 50Hz and that in the rotor is 2.5Hz. Determine (i) the slip (ii) speed of motor.	(4)
10	With neat circuit diagram, explain the working of capacitor start induction motor.	(4)

PART B

MODULE (1-4)

Answer any four questions, each carries 10 marks.

11 Find V_a and V_b using node analysis (10)



12 A mild steel ring of 30cm mean circumference has an air gap of length 1 mm. The cross sectional area of the ring is 6cm^2 and is wound with a wire of 500 (10)

turns. It is found that a current of 4A in the winding produces a flux density of 1T in the air gap. Find the relative permeability of mild steel

13 a) Find the values of circuit elements in a two element series circuit which consumes 700W at a power factor of 0.707 leading. The applied voltage is a single phase ac voltage given by v = 141.4 sin (314t). (6)

b) In two wattmeter method of three phase power measurement the total power measured was 30kW at a power factor of 0.7 lagging. Find the reading of each wattmeter. (4)

14 a) With a neat diagram , explain the generation of balanced three Phase alternating voltage. Also draw the three phase voltage waveform. (6)

b) A resistance of 120Ω and capacitive reactance of 250Ω are connected in series across a single phase ac voltage source. If a current of 0.9A is flowing in the circuit find (i)power factor (ii)supply voltage (iii)Active power (iv) reactive power (4)

15 Draw a neat schematic diagram of a Nuclear power plant and explain its operation. (10)

16 a) Draw and explain the single line diagram of a typical power transmission system (7)

b) What is the need for high voltage transmission? (3)

MODULE 5

Answer any one full question, each carries 10 marks.

17 a) A DC motor rated at 500V takes a current of 40A. The resistance of the armature is 0.2 ohm. The machine has 6 poles and the armature is lap wound with 864 conductors. If the flux per pole is 0.05Wb, calculate (i) speed of the motor (ii) torque developed by the armature. (8)

b) What will be the speed of the machine if the armature is wave wound. (2)

18 A transformer is rated 100kVA, 6600/400V. Determine the currents on high voltage and low voltage sides and turn ratio. If the maximum flux in the core is 0.02wb, find the number of turns on the primary and secondary. (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 a) Explain the principle of operation of a three phase induction motor. (6)

b) A 50Hz induction motor has 2 poles and runs at 2930 rpm. Calculate (4)

(i) The synchronous speed (ii) The percentage slip.

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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.

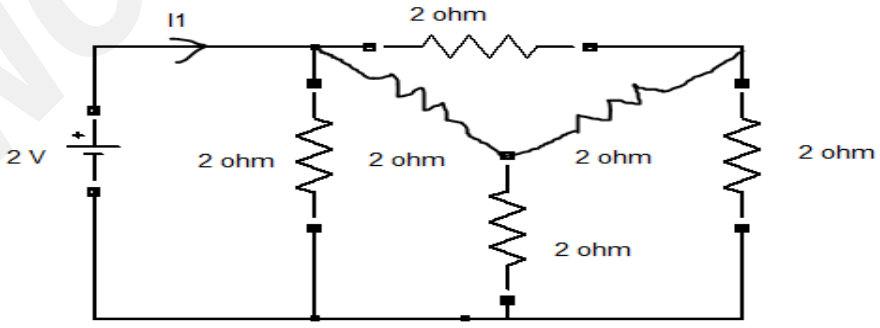
		Marks
1	Draw and explain the V-I characteristics of ideal and actual current sources.	(4)
2	Differentiate between statically induced emf and dynamically induced emf.	(4)
3	What are the advantages of three phase system over single phase system?	(4)
4	Define Active power, Reactive power and Apparent Power? 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.

11 Find current I_1 in figure by using Y - Δ transformation. (10)



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 $10cm^2$. 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+π/3) is applied to a series RL circuit. The current drawn is i=25 sin (314t+π/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 50Ω 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 0.15ohm. 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-φ 4 pole induction motor is supplied from 3φ 50Hz ac supply. Find (i) synchronous speed (ii) rotor speed when slip is 4% (iii) the rotor frequency when runs at 600r.p.m.	(8)
	b)	Classify induction motor according to its rotor construction	(2)