KADI SARVA VISHWAVIDHYALAYA

B.E. Semester V (EE) Examination (Nov-2016)

Subject Code: - EE-505 **Subject Name:** - Element of Electrical Design and Costing

Date: -19/11/2016 **Time:** -10:30 am to 01:30 pm **Total Marks:-** 70

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory.**
4. Indicate **clearly,** the options you attempt along with it's with respective question number.
5. Use the last page of main supplementary of **rough work.**

Section – I

Q.1(A) Define space factor applied to magnetic coil design and how it can be calculated in bedded and unbedded conductors. 05

(B) Explain necessity of starter in a dc motor. Explain three point starter. 05

(C) State properties of good insulating materials. 05

OR

(C) Calculate the apparent flux density particular at a section of a tooth from the following data: 05

Tooth Width=12mm Slot width= 10 mm Ventilating ducts=4each of 10 mm wide Gross length of core=32cm Real flux density= 2.2T Permeability of tooth material corresponding to real flux density= 31.4 $\times 10^{-6}$ H/m Stacking factor=0.9

Q.2(A) Give the comparison between magnetic and electric circuit. 05

(B) Explain horse shoe type electromagnet. 05

OR

Q.2(A) Define real and apparent flux densities in the tooth of a DC machine armature. Explain the difference between them and also derive the difference between them. 05

(B) Explain back emf starter with diagram 05

Q.3(A) Determine the airgap length of a DC machine from the following data: 05

- Gross core length = 0.1 m
- Carter's co-efficient for slots and ducts = 0.3
- Number of ducts = 1
- Gap flux density at pole center = 0.65 T
- Width of duct = 10 mm
- Field MMF per pole = 3800 A
- Slot pitch = 24 mm
- MMF required for iron parts of magnet circuit = 600 A
- Slot width = 12 mm

(B) What is eddy current loss & iron loss. What are the equation for both. 05

OR

Q.3 (A) Determine the MMF required for the airgap of a a machine with open slots from the following particulars: 05

• Slot pitch = 4.3 cm	• Airgap length = 0.6 cm
• Slot opening = 2.1 cm	• Flux per pole = 0.056 Wb
• Gross length of core = 48 cm	• Number of ventilating ducts = 8
• Pole arc = 18 cm	• Width of ventilating duct = 1.2 cm

Ratio : slot opening/ gap length	1	2	3	3.4	4
Carter's co-efficient	0.15	0.28	0.37	0.41	0.43

The above may be used for ducts also.

(B) An electromagnet coil has an outer diameter of 0.6 m and an internal diameter of 0.3 m. Its height is 0.25 m. The outer cylindrical surface of the coil can dissipate 1200 W/m^2.Calculate the total mmf of the coil if voltage applied across the coil is 100 V. Assume space factor = 0.6, Resistivity = $0.02\Omega/m/mm^2$ 05

Section – II

Q.4 (A) What is estimating? Explain the purpose of estimating. 05

(B) Which are types of load? explain in detail 05

(C) Draw wiring diagram, schematic diagram and a single line diagram to control one lamp, one tube light and one fan with their respective switches installed in one switch board. 05

OR

(C) Which are types of wiring systems? Explain cleat wiring and conduit wiring system. 05

Q.5(A) Define following terms. 05

(i) Connected load (ii) Maximum demand (iii) average load (iv) diversity factor (v) luminous intensity

(B) Explain different factors for selection of type of wiring. 05

OR

Q.5(A) An illumination on the working plane of 75 lux is required in a room 72m x 15m in size. The lamps are required to be hung 4m above the work bench. Assuming a suitable space height ratio, a utilization factor of 0.5,a lamp efficiency of 14 lumens per watt and a candle power depreciation of 20 %,estimate the number rating and deposition of lamps. 05

(B) Write steps for designing welding transformer. 05

Q.6(A) Determine following data for a single phase shell type transformer 230/60 V, 50 Hz to deliver a load current of 2.5 Amps. 05
(i) Core design (ii) Winding design

(B) Which are types of AC supply system? Explain 3-phase, 3-wire system. 05

OR

Q.6(A) Write steps for designing small transformer with formula. 05

(B) The domestic load in residential building is used in the following manner : 05

Computer 40w,5hrs/day
Water pump 150w, 2hrs/day
Lamps 55w each , 6 nos. 8 hrs./day
Fans 65w each, 4 nos. 12 hrs./day
Refrigerator of 300w, 12 hrs./day
Heater of 1000w, 2 hrs./day
Television of 120w, 10 hrs./day
Calculate : (a) connected load (b) daily load factor

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester V Examination (April-2015)

Subject Code: - EE-505 **Subject Name: - Element of Electrical Design and Costing**

Date: - 24/04/2015 **Time: - 10:30am to 1:30pm** **Total Marks:- 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory.**
4. Indicate **clearly,** the options you attempt along with it's with respective question number.
5. Use the last page of main supplementary of **rough work.**

Section – I

Q.1 **(A)** Define space factor applied to magnetic coil design and how it can be calculated in bedded and unbedded conductors. **5**

(B) Calculate the apparent flux density at a section of the teeth of an armature of a d.c. machine from the following data at that section. **5**

Slot pitch=20mm
Slot width= tooth width=10mm
Length of armature core including 4 ducts each 8mm = 35cm
Stacking factor= 0.9
Real flux density at that section= 2.2 T for which the MMF is 65000A/m

(C) Discuss the design procedure for the coil of electromagnet. **5**

OR

(C) Derive the expression of reluctance of an air gap in DC machine. Explain clearly the effects of slotting and ventilating ducts. Also derive the expression for the mmf required for the air gap in the case of slotted armatures. **5**

Q.2 **(A)**Define real and apparent flux densities in the tooth of a DC machine armature. Explain the difference between them and also derive the difference between them. **5**

(B) An electromagnet coil has an outer diameter of 0.8 m and an internal diameter of 0.4 m. Its height is 0.30 m. The outer cylindrical surface of the coil can dissipate 1500 W/m^2. **5**
Calculate the total mmf of the coil if voltage applied across the coil is 150 V.
Assume space factor = 0.6, Resistivity = $0.02\Omega/m/mm^2$

OR

(A) What are eddy currents? Derive the expression of eddy current loss in a thin sheet. Take necessary assumptions. **5**

(B) Enlist methods of starting three phase induction motor. Explain any one in detail. **5**

Q.3 (A)Explain necessity of starter in a dc motor. Explain three point starter with a neat diagram. 5
(B) Determine the air gap length of D.C Machine for the following data: 5

Gross core length=0.1m
No. of Ducts=01
Width of duct=10mm
Slot pitch=24mm
Slot width=12mm
Carter's coefficient for slot and ducts=0.3
Gap flux density at pole centre =0.60T
Field MMF per pole=3600A
Mmf required for iron parts of magnetic circuit=600A.

OR

(A)Give the steps for designing flat face armature type electromagnet. 5

(B) A coil of 5000 turns has an outside diameter of 180 mm and an inside diameter of 10 mm . 5
Estimate the number of turns to be removed from outside to reduce the resistance by 30 %.

Section – II

Q.4 (A) Which are the points to be considered for calculating the size of conductors and explain. 5
(B) Draw wiring diagram, schematic diagram and a single line diagram to control one lamp, one tube light and one fan with their respective switches installed in one switch board. 5

(C)Which are types of wiring systems? Explain wooden casing system. 5

OR

(C) Write steps for designing welding transformer. 5

Q.5 (A)Explain conduit wiring system. Write advantage and application for that. 5

(B)Write steps for designing small transformer with formula. 5

OR

(A)Define following terms. 5
(i) average load (ii) diversity factor (iii) illumination (iv) lux (v) lumen

(B) An illumination of 210 lux is to be provided in a classroom 12m × 10m with 40W fluorescent lamps. Determine the number and layout of lamps in the lighting installation. 5

Assume : Coefficient of utilization = 0.5
Depreciation factor = 0.8
Efficiency of tubes = 40 lumens/watt , waste light factor = 1

Q.6 (A)Which are types of AC supply system? Explain 3-phase, 3-wire system. 5
(B) The domestic load in residential building is used in the following manner : 5
Fluorescent lamps 50w each , 5 nos. 6 hrs./day
Fans 70w each, 3 nos. 6 hrs./day
Refrigerator of 350w, 10 hrs./day
Heater of 1000w, 3 hrs./day
Television of 130w, 4 hrs./day
Calculate : (a) connected load (b) daily load factor

OR

(A) Design a single phase small transformer having an output 4A at 18V. the primary winding is connected to 230V, 50Hz a.c supply. Efficiency = 85% , Te = 9 **5**

Calculate (i) required core size (ii) number of turns in primary and secondary windings.
(iii) wire size for primary and secondary windings

δ=2.3 , d=0.315mm, d1=0.38mm

(B) Explain utilization factor and waste light factor. **5**

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester V (EE) Examination (Nov-2015)

Subject Code: - EE-505 **Subject Name: - Element of Electrical Design and Costing**

Date: - 28/11/2015 **Time: - 10:30 to 1:30** **Total Marks:- 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory.**
4. Indicate **clearly,** the options you attempt along with it's with respective question number.
5. Use the last page of main supplementary of **rough work.**

Section – I

Q.1 (A) Derive the expression of reluctance of an air gap in DC machine. Explain clearly the effects of slotting and ventilating ducts. Also derive the expression for the mmf required for the air gap in the case of slotted armatures. 5

(B) Calculate the apparent flux density particular at a section of a tooth from the following data: 5
Tooth Width=1.2cm
Slot width= 1 cm
Gross length of core=25cm
Number of duct=4 and width of duct =1 cm
Real flux density= 1.9T
Permeability of tooth material corresponding to real flux density= 31.4×10^{-6} H/m
Stacking factor=0.9

(C) Discuss the design procedure for the coil of electromagnet. 5

OR

(C) Define space factor applied to magnetic coil design and how it can be calculated in bedded and unbedded conductors 5

Q.2 (A) Define real and apparent flux densities in the tooth of a DC machine armature. Explain the difference between them and also derive the difference between them. 5

(B) An electromagnet coil has an outer diameter of 0.6 m and an internal diameter of 0.3 m. Its height is 0.25 m. The outer cylindrical surface of the coil can dissipate 1200 W/m^2. 5
Calculate the total mmf of the coil if voltage applied across the coil is 100 V.
Assume space factor = 0.6, Resistivity = 0.02 $\Omega/m/mm^2$

OR

Q.2 (A) A coil is wound on a former has outside diameter of 80 mm and inside diameter of 30 mm. the height of the coil i.e. axial length of coil is 100 mm. calculate (i) the winding depth, total winding area and length of mean turn (ii) space factor and number of turns when conductors bed when they do not bed. The coil is wound with 35 SWG, S.C.C copper wire having an area of 0.0357 mm^2, a bare diameter of 0.213 mm and diameter with insulation of 0.313 mm 5

(B) Give the steps for designing flat face armature type electromagnet. 5

Q.3 (A) In the calculation of resistance steps for the starters of a d.c. shunt motor, prove that the resistance of n^{th} section is given by $r_n=\alpha^{n-1}r_1$ 5

(B) Determine the air gap length of D.C Machine for the following data: 5
Gross core length=0.1m
No. of Ducts=01
Width of duct=10mm
Slot pitch=24mm
Slot width=12mm
Carter's coefficient for slot and ducts=0.3
Gap flux density at pole centre =0.65T
Field MMF per pole=3800A
Mmf required for iron parts of magnetic circuit=600A.

OR

Q.3 (A) What is the function and necessity of field regulator in case of D.C. shunt motor? Explain briefly. 5

(B) Explain Direct On Line Starter with wiring diagram and control circuit. 5

Section – II

Q.4 (A) Which are types of wiring systems? Explain Conduit wiring system. 5

(B) Draw wiring diagram, schematic diagram and a single line diagram to control one lamp, one tube light and one fan with their respective switches installed in one switch board. 5

(C) Which are the points to be considered for calculating the size of conductors and explain. 5

OR

(C) Which are types of AC supply system? Explain 3-phase, 3-wire system. 5

Q.5 (A) Define following terms. 5
(i) average load (ii) diversity factor (iii) illumination (iv) solid angle (v) lumen

(B) Write steps for designing welding transformer. 5

OR

Q.5 (A) Explain conduit wiring system. Write advantage and application for that. 5

(B) An illumination of 315 lux is to be provided in a classroom 12m × 10m with 60W fluorescent lamps. Determine the number and layout of lamps in the lighting installation. 5
Assume : Coefficient of utilization = 0.5
Depreciation factor = 0.85
Efficiency of tubes = 30 lumens/watt , waste light factor = 1

Q.6 (A) Write steps for designing small transformer with formula. 5

(B) The domestic load in residential building is used in the following manner : 5
Fluorescent lamps 55w each , 4 nos. 6 hrs./day
Fans 70w each, 4 nos. 8 hrs./day
Refrigerator of 300w, 12 hrs./day
Heater of 1000w, 2 hrs./day
Television of 150w, 8 hrs./day
Calculate : (a) connected load (b) daily load factor

OR

Q.6 (A) Design a single phase small transformer having an output 3A at 12V. the primary winding is connected to 230V, 50Hz a.c supply. Efficiency = 90% , Te = 9 5
Calculate (i) required core size (ii) number of turns in primary and secondary windings.
(iii) wire size for primary and secondary windings
δ=2.3 , d=0.315mm, d1=0.34mm

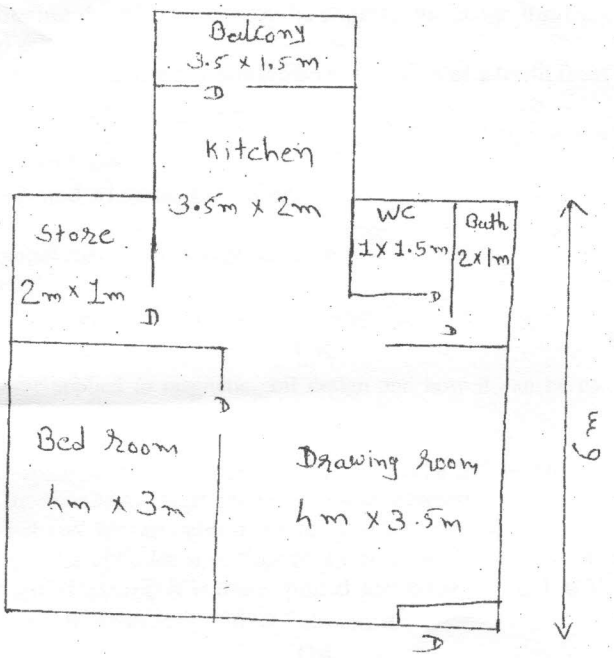
(B) The plan of a modern residential flat is shown in fig.1. The flat is to be provided with electrical connections 1-phase, 230v, 50Hz ac supply. 5

The details of electrical point to be installed are given below:

	Light	Fan	Plug socket
Drawing room	2	1	1
Bed room	2	1	1
Kitchen	1	1	1
Store	1	-	-
Bath	1	-	-
WC	1	-	-
Balcony	1	-	-

(i) Draw the installation plan

(ii) Calculate the length of PVC conduit required.



(fig. 1)

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester V

Subject Code: - EE-505 **Subject Name: - Element of Electrical Design and Costing**

Date: - 22/11/2014 **Time: - 10:30 to 1:30** **Total Marks:- 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of scientific calculator is permitted.
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Section – I

Q.1 **(A)** Derive the expression of reluctance of an air gap in DC machine. Explain clearly the effects of slotting and ventilating ducts. Also derive the expression for the mmf required for the air gap in the case of slotted armatures. **5**

(B) Calculate the apparent flux density at a section of the teeth of an armature of a d.c. machine from the following data at that section. **5**

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Length of armature core including 4 ducts each 8mm = 35cm
Stacking factor= 0.9
Real flux density at that section= 2.2 T for which the MMF is 65000A/m

(C) Discuss the design procedure for the coil of electromagnet. **5**

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(B) An electromagnet coil has an outer diameter of 0.6 m and an internal diameter of 0.3 m. Its height is 0.25 m. The outer cylindrical surface of the coil can dissipate 1200 W/m^2. Calculate the total mmf of the coil if voltage applied across the coil is 100 V. Assume space factor = 0.6, Resistivity = 0.02 $\Omega/m/mm^2$ **5**

OR

(A) Define real and apparent flux densities in the tooth of a DC machine armature. Explain the difference between them and also derive the difference between them. **5**

(B) Give the steps for designing flat face armature type electromagnet. **5**

Q.3 **(A)** Explain necessity of starter in a dc motor. Explain three point starter with a neat diagram. **5**

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(B) A coil of 5000 turns has an outside diameter of 180 mm and an inside diameter of 10 mm . Estimate the number of turns to be removed from outside to reduce the resistance by 30 %. **5**

Section – II

Q.4 **(A)** Which are types of wiring systems? Explain wooden casing system. **5**

(B) Draw wiring diagram, schematic diagram and a single line diagram to control one lamp, one tube light and one fan with their respective switches installed in one switch board. **5**

(C) Which are the points to be considered for calculating the size of conductors and explain. **5**

OR

(C) Write steps for designing welding transformer. **5**

Q.5 **(A)** Define following terms. **5**

(i) average load (ii) diversity factor (iii) illumination (iv) lux (v) lumen

(B) Which are types of AC supply system? Explain 3-phase, 3-wire system. **5**

OR

(A) Explain conduit wiring system. Write advantage and application for that. **5**

(B) An illumination of 210 lux is to be provided in a classroom 12m × 10m with 40W fluorescent lamps. Determine the number and layout of lamps in the lighting installation. **5**

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Efficiency of tubes = 40 lumens/watt , waste light factor = 1

Q.6 **(A)** Write steps for designing small transformer with formula. **5**

(B) The domestic load in residential building is used in the following manner : **5**

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Calculate (i) required core size (ii) number of turns in primary and secondary windings.

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(B) The plan of a modern residential flat is shown in fig.1. The flat is to be provided with electrical connections 1-phase, 230v, 50Hz ac supply. **5**

The details of electrical point to be installed are given below:

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Bath	1	-	-
WC	1	-	-
Balcony	1	-	-

(i) Draw the installation plan

(ii) Calculate the length of PVC conduit required.

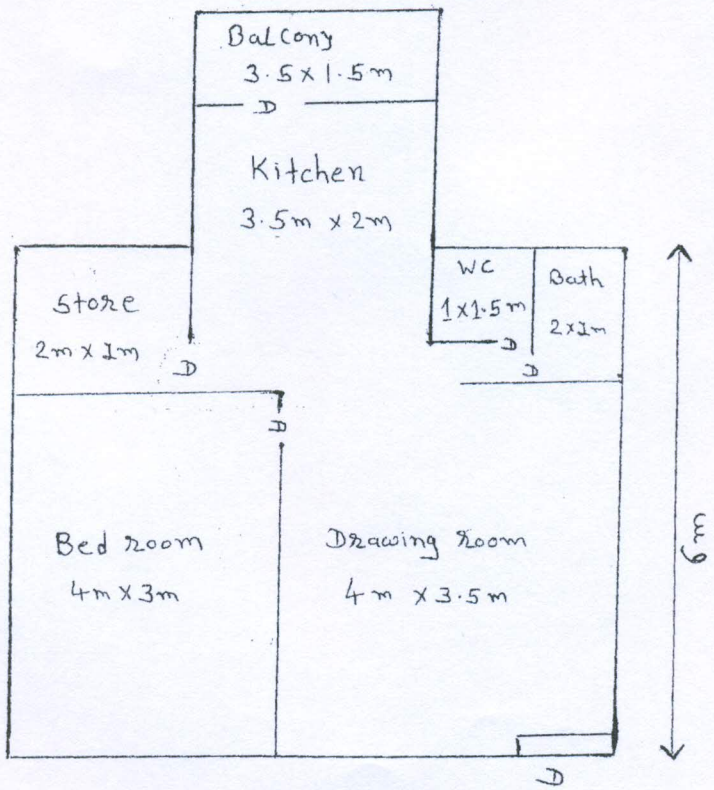

fig. 1