ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY – VJA – 8

II YEAR SEM –I ::I-MID TERM EXAM:: BRANCH: EEE DATE: 06-08-19 MAX: 30M

SUBJECT: RES ANSWER ALL THE QUESTIONS DUR: 90 MIN SET-1

1. Explain the terms Declination angle and Hour angle w.r.t Solar radiation Geometry (10m) (Level-1)
2. Discuss the construction and working of Liquid flat plate collector with a neat sketch. Explain the various parameters that affect the performance of collector. (Level-2)
3. Explain the Solar PV System Design Procedure step by step (10m) (Level-2)

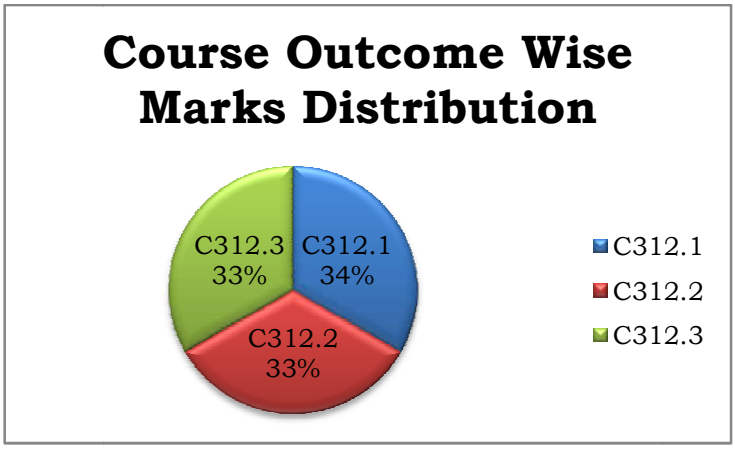
Internal Question Paper Analysis:

Name of the Course: RENEWABLE ENERGY SOURCES Year & Semester: III Year I Sem

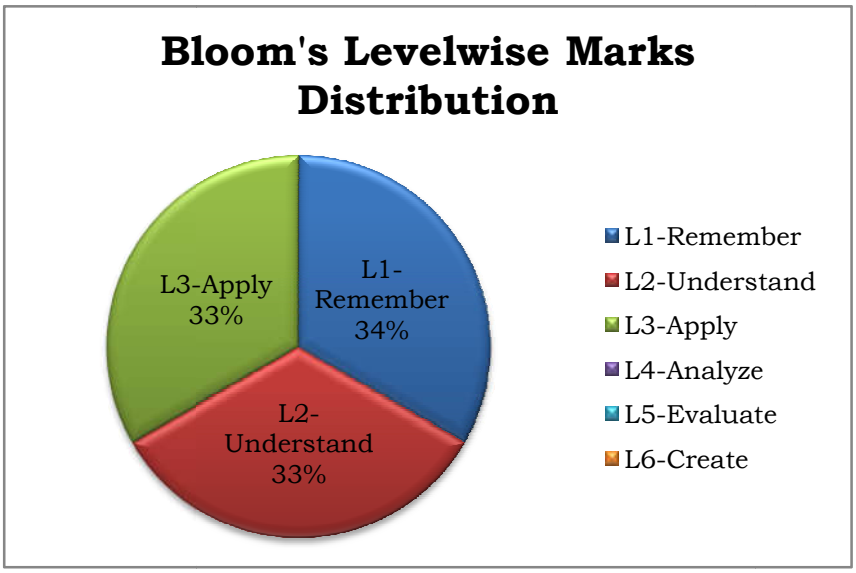
Course Code: C312 INTERNAL: 1

Q.No	Question	Marks	CO	TL
1	Explain the terms Declination angle and Hour angle w.r.t Solar radiation Geometry	10	C312.1	L1-Remember
2	Discuss the construction and working of Liquid flat plate collector with a neat sketch. Explain the various parameters that affect the performance of collector	10	C212.2	L2-Understand
3	Explain the Solar PV System Design Procedure step by step	10	C212.3	L3-Apply

CO	Marks	%
C312.1	10	33.33
C312.2	10	33.33
C312.3	10	33.33



TL	Marks	%
L1-Remember	10	33.33
L2-Understand	10	33.33
L3-Apply	10	33.33
L4-Analyze		
L5-Evaluate		
L6-Create		



SCHEME OF EVALUATION

1. Explain the terms Declination angle and Hour angle w.r.t Solar radiation Geometry

Definition of Declination angle & Formula 5m+ Hour Angle Definition Diagram & Formula 5M

2. Discuss the construction and working of Liquid flat plate collector with a neat sketch. Explain the various parameters that affect the performance of collector.?

Diagram 2m+Explanantion 3m+ Performance Analysis 5M

3. Explain the Solar PV System Design Procedure step by step?

Type of converter & its output 2m+ Load calculations 2m+Voltage Rating 2m+State of Charge 2m+ Inverter Selection 2m

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ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY – VJA – 8

II YEAR SEM –I ::II-MID TERM EXAM:: BRANCH: EEE DATE: 11-10-19 MAX: 30M

SUBJECT: EM-I ANSWER ALL THE QUESTIONS DUR: 90 MIN SET-1

1) Define Betz Co-efficient. Briefly explain the factors that determine the out power form wind energy. (L-1) 10M

2) Explain with sketches the various methods of tidal power generation. What are the limitations of each method? (L-2) 10M

3) What is aerobic & anaerobic Digestion Explain? (L-2) 10M

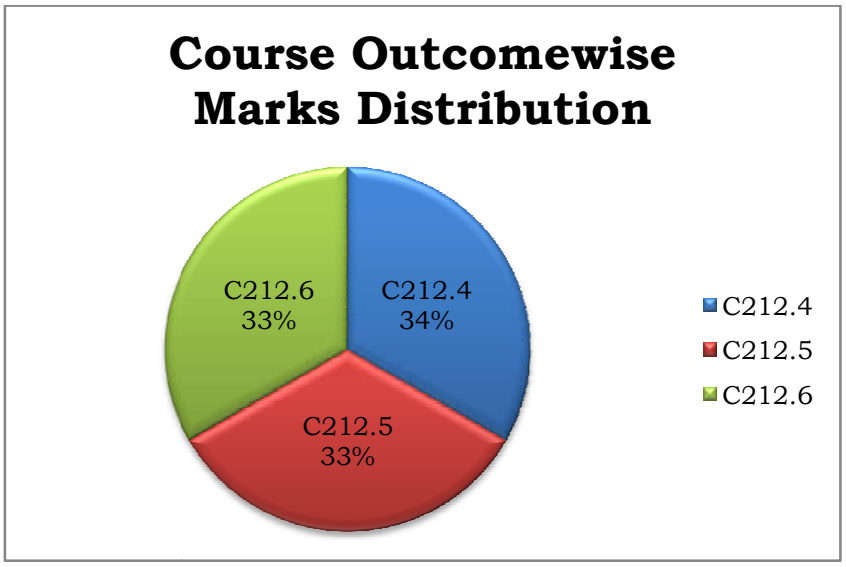
Internal Question Paper Analysis:

Name of the Course: RENEWABLE ENERGY SOURCES Year & Semester: III Year I Sem

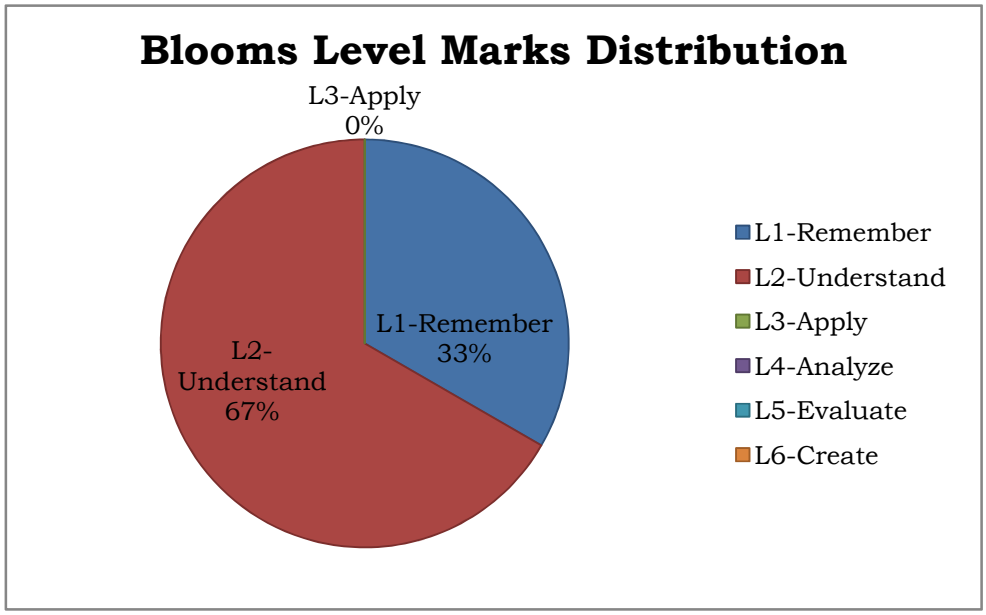
Course Code: C312 INTERNAL: 2

Q.No	Question	Marks	CO	TL
1	Define Betz Co-efficient. Briefly explain the factors that determine the out power form wind energy	10	C212.4	L1-Remember
2	Explain with sketches the various methods of tidal power generation. What are the limitations of each method?	10	C212.5	L2-Understand
3	What is aerobic & anaerobic Digestion Explain?	10	C212.5	L2-Understand

CO	Marks	%
C212.4	10	33.33
C212.5	10	33.33
C212.6	10	33.33



BTL	Marks	%
L1-Remember	10	33.33
L2-Understand	20	66.67
L3-Apply	0	0
L4-Analyze		
L5-Evaluate		
L6-Create		



Scheme of Evaluation:

1. Define Betz Co-efficient. Briefly explain the factors that determine the out power form wind energy**.**

Defintion 2m+Factors 8m (Type of turbine,Location, Generator, Types of winds,Tipspeed Ratio)

2. Explain with sketches the various methods of tidal power generation. What are the limitations of each method?

Tidal power Operation 2m+ Single Basin System 4m+Bouble Basin System 4m

3. What is aerobic & anaerobic Digestion Explain?

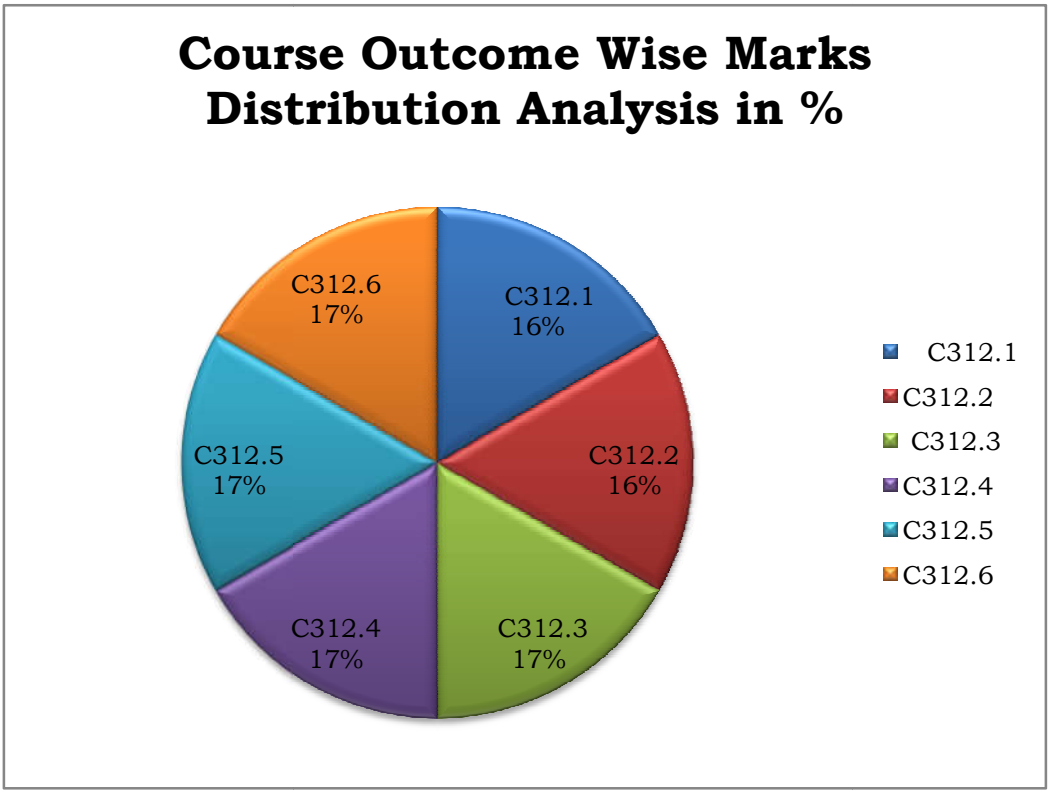
Definition of aerobic digestion & Explanation 5m+ Definition of anaerobic digestion & Explanation 5m

Data 1m+Transformation ratio 2m+ equivalent resistance 1m+ Cu losses 1m+ output in kw 1m+ efficiency at full load 2m+ half load 2m

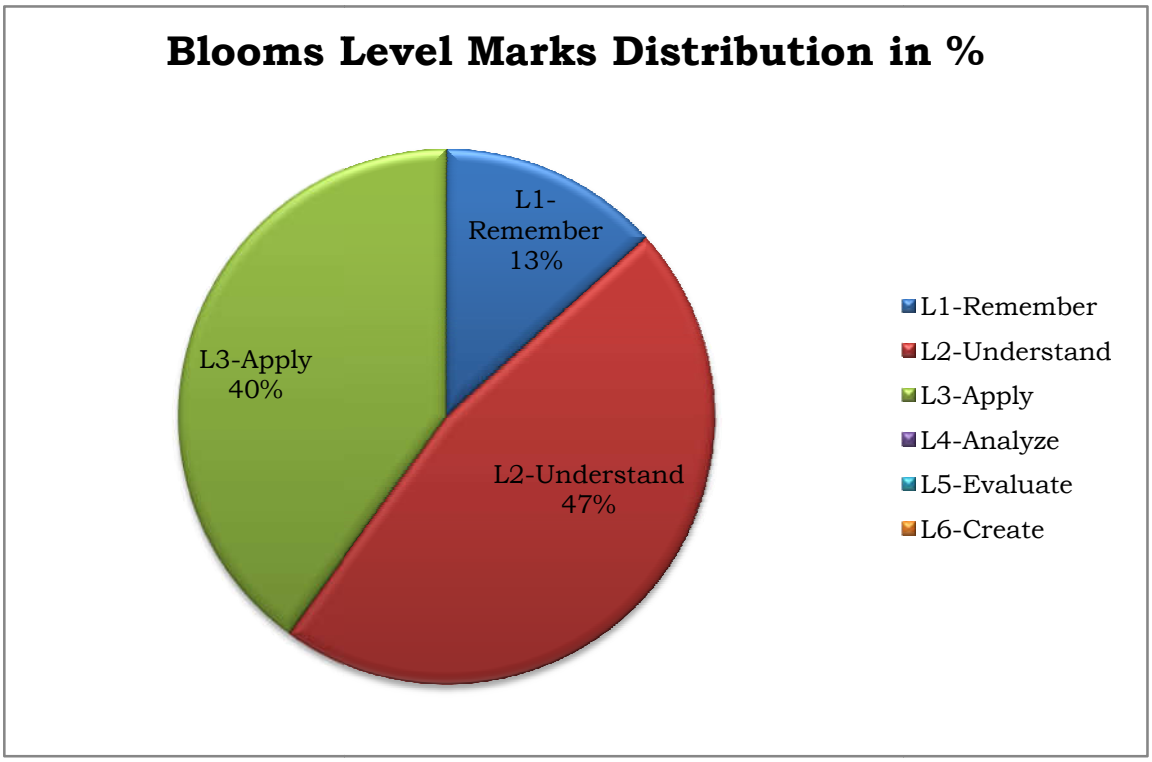
Assignment Question Paper Analysis:

Name of the Course: RENEWABLE ENERGY SOURCES Sem Course Code: C312		Year & Semester: III Year I Assignment Questions		
Q NO	**Assessment question**	**Marks**	**Connected CO**	**BTL of CO**
A1.1	Calculate the angle of incidence of beam radiation at 10.30 AM on Feb 10 at latitude 42^0. The wall is tilted at 45^0 and points 15^0 west of south.	**3**	**C312.1**	**L-3 APPLY**
A1.2	Write short notes on Solar measuring Devices?	**2**		**L-1 REMEMBER**
A2.1	Discuss the construction and working of Liquid flat plate collector with a neat sketch. Explain the various parameters that affect the performance of collector.	**3**	**C312.2**	**L-2 UNDERSTAND**
A2.2	With a neat sketch, explain the working of solar pond electric power plant	**2**		**L-1 REMEMBER**
A3.1	Draw and explain the P-V and I-V characteristics of the PV System for different Input quantities of irradiance and temperature.	**2**	**C312.3**	**L-2 UNDERSTAND**
A3.2	Explain the Solar PV System Design Procedure step by step	**3**		**L-3 APPLY**
A4.1	Derive the Wind power equation starting from the Kinetic energy equation.	**2**	**C312.4**	**L-2 UNDERSTAND**
A4.2	Prove that in case horizontal axis wind turbine maximum-power can be obtained when Exit velocity= 1/3 wind velocity. $P_{max} = 8/27\ \rho A V i^3$.	**3**		**L-3 APPLY**
A5.1	A 4m Wave has period of 10s Find the energy and Power density of the wave ,take water density ad 1025 kg/m^3	**3**	**C312.5**	**L-3 APPLY**
A5.2	Derive kinetic & potential energy equation associated with wave power	**2**		**L-2 UNDERSTAND**
A6.1	What is arobic & anaerobic Digestion Explain?	**3**	**C312.6**	**L-2 UNDERSTAND**
A6.2	Distinguish between Fixed and Float drum Biodigesters.	**2**		**L-2 UNDERSTAND**

CO	MARKS	PERCENTAGE (%)
C312.1	5	16.67
C312.2	5	16.67
C312.3	5	16.67
C312.4	5	16.67
C312.5	5	16.67
C312.6	5	16.67



BTL	Marks	%
L1-Remember	4	13.33
L2-Understand	14	46.67
L3-Apply	12	40
L4-Analyze		
L5-Evaluate		
L6-Create		



End Semester Paper Analysis:

Name of the Course: Renewable Energy Sources **Year & Semester: III Year I**

Sem Course Code: C312 **Semester End Paper- SET 1**

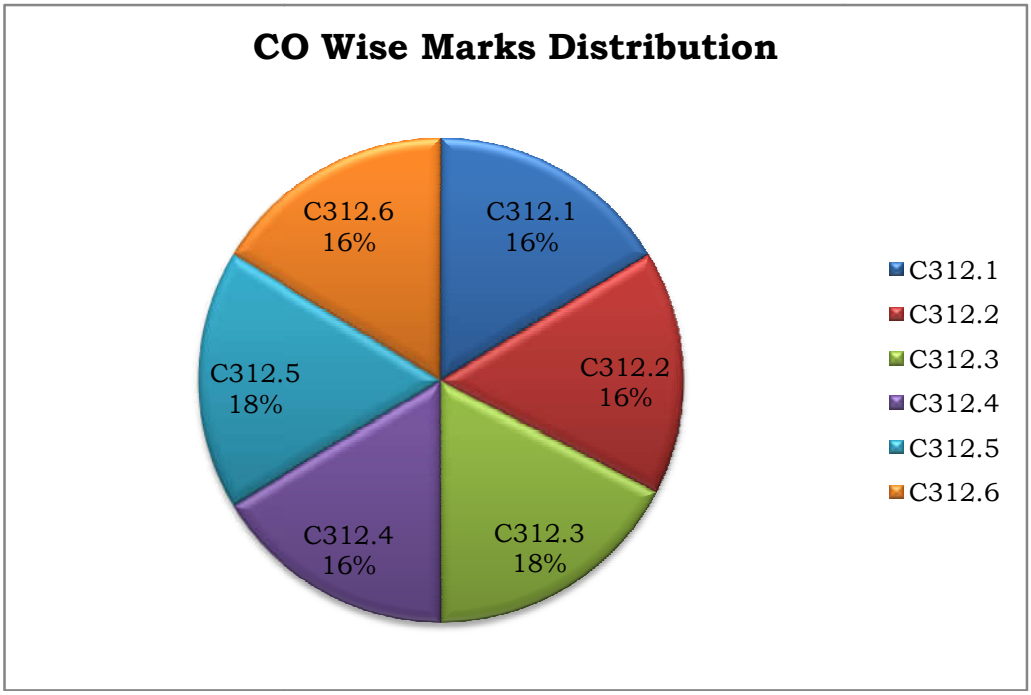
	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			SET-1
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	Explain in brief about Local Solar time or local Apparent time.	**3**	**C311.1**	**L-1 REMEMBER**
1.b	What do you mean by a passive Solar space heating system?	**2**	**C311.2**	**L-1 REMEMBER**
1.c	What do you mean by a passive Solar space heating system?	**2**	**C311.3**	**L-2 UNDERSTAND**
1.d	Name the device used to measure the Wind Speeds and on what effect will it work?	**2**	**C311.4**	**L-1 REMEMBER**
1.e	Distinguish between tidal, Ocean thermal and Wave Energy.	**3**	**C311.5**	**L-2 UNDERSTAND**
1.f	Classify Geothermal Sources	**2**	**C311.6**	**L-1 REMEMBER**
2.a	List the advantages and limitations of renewable energy sources	**7**	**C312.1**	**L-2 UNDERSTAND**
2.b	Estimate the daily global radiation on a horizontal surface at Baroda (22^0 13' N, 73^0 13'E) during the month of march. If constants *a* and *b* (which depends on the location) are given as 0.28 and 0.48 respectively and average sunshine hours for day are 9.5	**7**	**C312.1**	**L-3 APPLY**
3.a	Explain the different methods of Sun Tracking.	**7**	**C312.2**	**L-1 REMEMBER**
3.b	With the help of a neat sketch explain about Solar heating system using water heating Solar collectors	**7**	**C312.2**	**L-1 REMEMBER**
4.a	Explain the performance characteristics of a Solar Cell.	**7**	**C312.3**	**L-2 UNDERSTAND**
4.b	A Solar cell has an output capability of 0.5 A at 0.44 V. A series/Parallel solar array has been designed of such cells with 100 parallel strings and each string has 300 cells in series. Calculate: i) Voltage capability; ii) Current capability and, iii) Power output capability of array	**7**	**C312.3**	**L-3 APPLY**
5.a	List the factors responsible for distribution of wind energy on the surface of the Earth.	**7**	**C312.4**	**L-1 REMEMBER**
5.b	Discuss the aerodynamic considerations in Windmill design.	**7**	**C312.4**	**L-1 REMEMBER**
6.a	Explain about Micro hydro Power plant with a neat layout	**7**	**C312.5**	**L-1 REMEMBER**
6.b	List the advantages and disadvantages of Tidal energy.	**7**	**C312.5**	**L-2 UNDERSTAND**
7.a	What is meant by anaerobic digestion? List the factors that affect bio digestion.	**7**	**C312.6**	**L-1 REMEMBER**
7.b	Explain the main type of turbines, which may be used for Geothermal energy conversion	**7**	**C312.6**	**L-1 REMEMBER**

	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	Define solar constant.	**2**	**C311.1**	**L-1 REMEMBER**
1.b	Explain the principle of conversion of solar energy into heat.	**2**	**C311.2**	**L-1 REMEMBER**
1.c	What is the importance of the term fill factor as a performance parameter for a solar cell?	**2**	**C311.3**	**L-2 UNDERSTAND**
1.d	Define the tip speed ratio of wind turbines. Why it is important?	**3**	**C311.4**	**L-1 REMEMBER**
1.e	Explain the difference between spring and neap tides	**3**	**C311.5**	**L-2 UNDERSTAND**
1.f	What benefits may occur if an anaerobic digester is installed at a cattle farm?	**2**	**C311.6**	**L-1 REMEMBER**
2.a	Explain the different angles that are used in solar radiation geometry	**7**	**C312.1**	**L-1 REMEMBER**
2.b	Given in detail the comparison between conventional and renewable energy sources.	**7**	**C312.1**	**L-2 UNDERSTAND**
3.a	Enumerate the different types of concentrating type collector. Describe a collector used in power plant for generation of electrical energy	**7**	**C312.2**	**L-1 REMEMBER**
3.b	Explain in detail about the Transmissivity of Cover system.	**7**	**C312.2**	**L-1 REMEMBER**
4.a	Draw and explain an equivalent circuit of a practical solar PV cell	**7**	**C312.3**	**L-1 REMEMBER**
4.b	Explain how Hill climbing technique of maximum Power Point technique is used in PV system.	**7**	**C312.3**	**L-3 APPLY**
5.a	Explain the operation of horizontal axis wind mills.	**7**	**C312.4**	**L-1 REMEMBER**
5.b	With usual notations, derive an expression for maximum power output of wind turbine	**7**	**C312.4**	**L-2 UNDERSTAND**
6.a	Describe the different types of turbines are in use for small scale hydroelectric plants.	**7**	**C312.5**	**L-1 REMEMBER**
6.b	What are the advantages and limitations of wave energy conversion? Explain.	**7**	**C312.5**	**L-1 REMEMBER**
7.a	Explain the constructional details and working of KVIC digester.	**7**	**C312.6**	**L-1 REMEMBER**
7.b	What is a fuel cell? Describe the principle of working of a fuel cell withreference to H_2-O_2 cell..	**7**	**C312.6**	**L-2 UNDERSTAND**

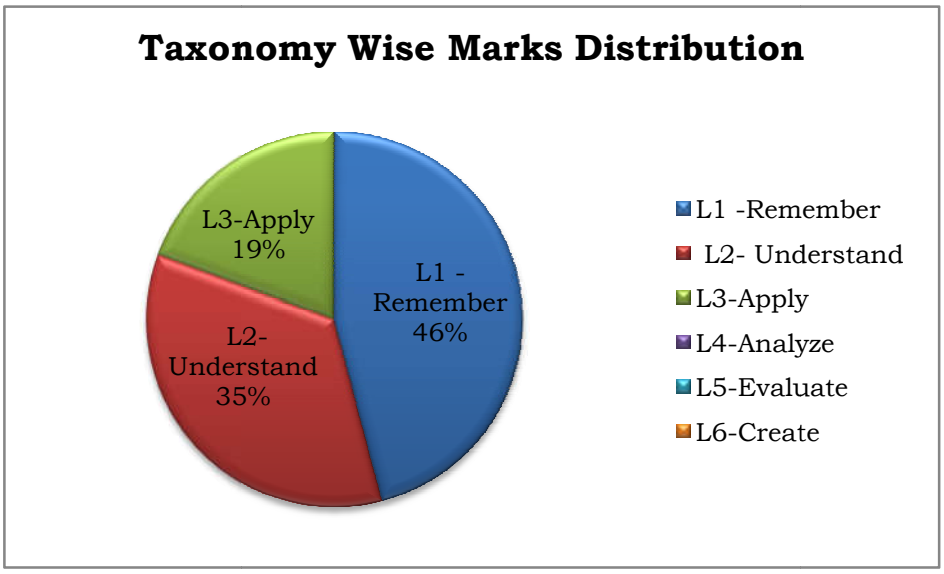
	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	What are the reasons for variation in solar radiation reaching the earth than received at the outside of the atmosphere?	**2**	**C311.1**	**L-1 REMEMBER**
1.b	Why orientation is needed in concentrating type collectors?	**2**	**C311.2**	**L-2 UNDERSTAND**
1.c	Define photo voltaic effect	**2**	**C311.3**	**L-1 REMEMBER**
1.d	A wind turbine has a rated power of 100 kW and rated speed of 12 m/s. Estimate its power output in a wind speed of 9 m/s	**3**	**C311.4**	**L-3 APPLY**
1.e	Explain the difference in method of operation between an impulse turbine and reaction turbine.	**3**	**C311.5**	**L-2 UNDERSTAND**
1.f	Name and quantify anaerobic digestion temperature ranges.	**2**	**C311.6**	**L-1 REMEMBER**
2.a	Explain in detail various forms of renewable energy	**7**	**C312.1**	**L-1 REMEMBER**
2.b	Determine the average value of solar radiation on a horizontal surface for June 22, at the latitude of 10_0 N, if constants *a* and *b* are given as equal to equal to 0.30 and 0.51 respectively, and the ratio n/N=0.55.	**7**	**C312.1**	**L-3 APPLY**
3.a	What are the advantages and disadvantages of concentrating collectors over flatplate collectors? Explain.	**7**	**C312.2**	**L-2 UNDERSTAND**
3.b	What is the main application of a solar pond? Describe briefly	**7**	**C312.2**	
4.a	Explain the different conditions on which the PV system performance depends?	**7**	**C312.3**	**L-2 UNDERSTAND**
4.b	List and explain the different losses that lead to the less efficiency of a Solar cell.	**7**	**C312.3**	**L-1 REMEMBER**
5.a	What are the most favourable sites for installing of wind turbines? Explain the major applications of wind power.	**7**	**C312.4**	**L-2 UNDERSTAND**
5.b	Using Betz model of a wing turbine, derive the expression for power extracted from wind	**7**	**C312.4**	**L-2 UNDERSTAND**
6.a	Derive the expressions for P.E and K.E of the wave energy	**7**	**C312.5**	**L-3 APPLY**
6.b	The observed difference between the high and low water ride is 8.5 m, for a proposed tidal site. The basin area is about 0.5 sq. km which can generate power for 3 hrs in each cycle. The average available head is assumed to be 8 m, and the overall efficiency of generation to be 70%. Calculate the power in h.p. at any instant and the yearly power output. Average specific weight of sea water is assumed to be 1025 kg/m_3	**7**	**C312.5**	**L-3 APPLY**
7.a	Explain how the heat is extracted from hot dry rocks?	**7**	**C312.6**	**L-1 REMEMBER**
7.b	What are the advantages and disadvantages of floating drum plant? Explain.	**7**	**C312.6**	**L-2 UNDERSTAND**

	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	Explain what the need of alternate energy sources is?	**2**	**C311.1**	**L-1 REMEMBER**
1.b	Write short notes on solar heater..	**2**	**C311.2**	**L-1 REMEMBER**
1.c	Explain the effect of shunt resistance in equivalent circuit of a PV cell.	**2**	**C311.3**	**L-1 REMEMBER**
1.d	A wind turbine has a rated power of 100 kW and rated speed of 12 m/s. Estimate its power output in a wind speed of 18 m/s	**3**	**C311.4**	**L-3 APPLY**
1.e	Briefly explain cavitation that may occur in a reaction turbine	**3**	**C311.5**	**L-1 REMEMBER**
1.f	Write short notes on applications of fuel cells	**2**	**C311.6**	**L-2 UNDERSTAND**
2.a	Discuss how the average solar radiation is estimated.	**7**	**C312.1**	**L-2 UNDERSTAND**
2.b	Calculate the angle made by the beam radiation with the normal to a flat-plate collector pointing due south located in New Delhi ($28^0$38'N, $77^0$17'E) at 9:00 hour, solar time on December 1. The collector is tilted at angle of 36^0 with horizontal.	**7**	**C312.1**	**L-3 APPLY**
3.a	Data for a flat plate collector used for heating are given below Calculate (i) solar attitude angle (ii) incident angle (iii) collector efficiency	**7**	**C312.2**	**L-3 APPLY**
3.b	What is the principle collection of solar energy used in a non-convective solar pond? Describe a non-convective solar pond for solar energy collection and storage.	**7**	**C312.2**	**L-2 UNDERSTAND**
4.a	Draw and explain the P-V and I-V characteristics of the PV System for different Input quantities of irradiance & temperature	**7**	**C312.3**	**L-2 UNDERSTAND**
4.b	Explain the term fill factor and its importance as a performance parameter for a solar cell.	**7**	**C312.3**	**L-2 UNDERSTAND**
5.a	Wind at 1 standard atmospheric pressure and 15 ^{0}C temperature has a velocity of 10 m/s. The turbine has diameter of 120 m and its operating speed in 40 rpm at maximum efficiency. Calculate: i) The total power density in the wind stream. ii) The maximum obtainable power density assuming, efficiency=40%. iii) The total power produced (in kW) and iv) The torque and axial thrust	**7**	**C312.4**	**L-3 APPLY**
5.b	What are advantages of vertical axis machines over horizontal type? Explain	**7**	**C312.4**	**L-2 UNDERSTAND**
6.a	Explain with sketches the various methods of tidal power generation. What are the limitations of each method?	**7**	**C312.5**	**L-2 UNDERSTAND**
6.b	Write short notes on small head hydro power development.	**7**	**C312.5**	**L-1 REMEMBER**
7.a	With a neat sketch, explain Janta model digestion plant.	**7**	**C312.6**	**L-1 REMEMBER**
7.b	Explain the working of fuel cell with a neat sketch	**7**	**C312.6**	**L-1 REMEMBER**

CO	Marks	%
C312.1	16	16.3265
C312.2	16	16.3265
C312.3	17	17.3469
C312.4	16	16.3265
C312.5	17	17.3469
C312.6	16	16.3265

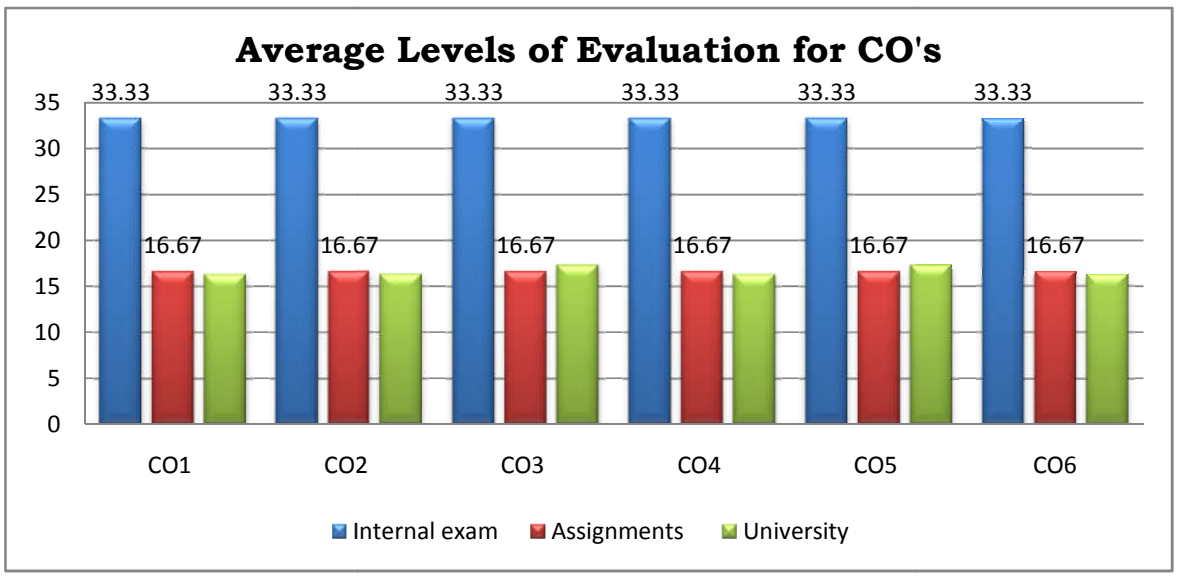


Overall (4 Sets)			Average of 4 Sets		
TL	**Marks**	**%**	**TL**	**Marks**	**%**
L1 -Remember	180	45.91837	L1 -Remember	45	45.91837
L2- Understand	136	34.69388	L2- Understand	34	34.69388
L3-Apply	76	19.38776	L3-Apply	19	19.38776
L4-Analyze			L4-Analyze		
L5-Evaluate			L5-Evaluate		
L6-Create			L6-Create		



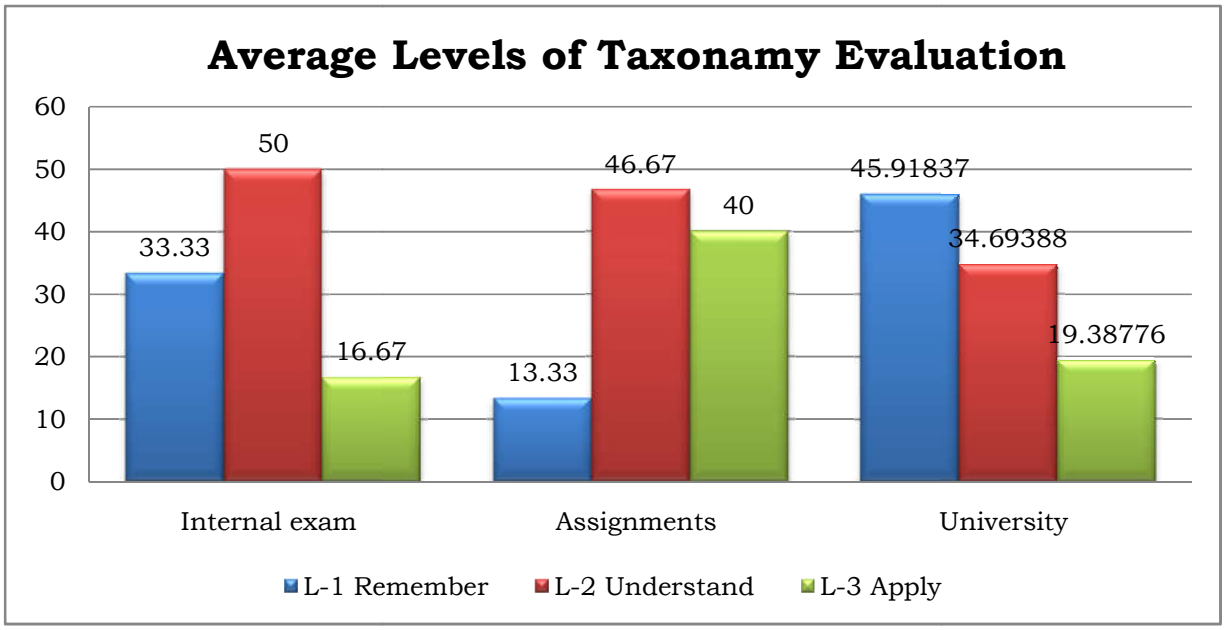
Average levels of evaluation for the COs (2017-18):

COs	CO1	CO2	CO3	CO4	CO5	CO6
Internal exam Percentage	33.33	33.33	33.33	33.33	33.33	33.33
Assignments	16.67	16.67	16.67	16.67	16.67	16.67
University	16.3265	16.3265	17.3469	16.3265	17.3469	16.3265



Average levels of Taxonomy evaluation:

COs	L-1 Remember	L-2 Understand	L-3 Apply	Analyze	Evaluate	Create
Internal exam	33.33	50	16.67	-	-	-
Assignments	13.33	46.67	40			
University	45.91837	34.69388	19.38776			



ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY – VJA – 8

II YEAR SEM –I ::I-MID TERM EXAM:: BRANCH: EEE DATE: 22-08-19 MAX: 30M

SUBJECT: EM-I ANSWER ALL THE QUESTIONS DUR: 90 MIN SET-1

1. Explain the experimental procedure to find critical resistance and speed of a dc Generator? (10m) (Level-1)
2. Draw & Explain the characteristics of DC shunt & Series Motors? (Level-2)
3. If a break test conducted on a dc shunt motor the full load readings are observed as tension on tight side is 9.1kg tension on slake side is 0.8kg total current is 10A supply voltage is 110V speed is 1320 rpm radius of the pulley is 7.5 cm calculate full load efficiency. (10m) (Level-3)

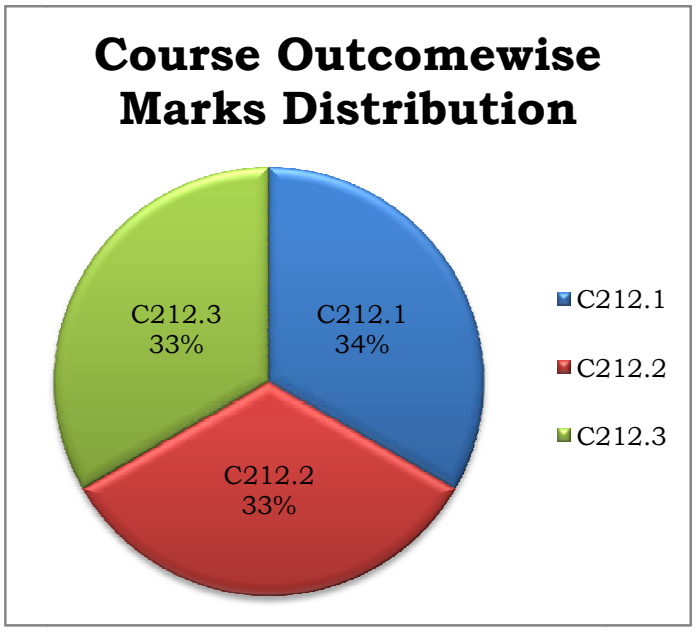
Internal Question Paper Analysis:

Name of the Course: Electrical Machines-I **Year & Semester: II Year I Sem**

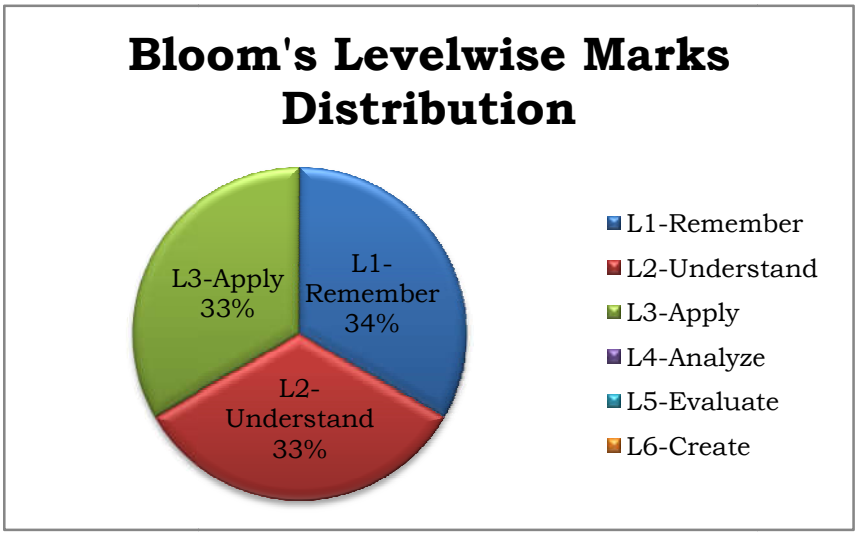
Course Code: C212 **INTERNAL: 1**

Q.No	Question	Marks	CO	TL
1	Explain the experimental procedure to find critical resistance and speed of a dc Generator?	10	C212.1	L1-Remember
2	Draw & Explain the characteristics of DC shunt & Series Motors?	10	C212.2	L2-Understand
3	If a break test conducted on a dc shunt motor the full load readings are observed as tension on tight side is 9.1kg tension on slake side is 0.8kg total current is 10A supply voltage is 110V speed is 1320 rpm radius of the pulley is 7.5 cm calculate full load efficiency.	10	C212.3	L3-Apply

CO	Marks	%
C212.1	10	33.33
C212.2	10	33.33
C212.3	10	33.33



TL	Marks	%
L1-Remember	10	33.33
L2-Understand	10	33.33
L3-Apply	10	33.33
L4-Analyze		
L5-Evaluate		
L6-Create		



SCHEME OF EVALUATION

1.Explain the experimental procedure to find critical resistance and speed of a dc Generator?

Definition of Rc 2m+ Circuit Diagram 2m+Procedure 2m+Graphs 2m+Calculation 2m

2. Draw & Explain the characteristics of DC shunt & Series Motors?

Series motor Characteristic equations2m+ Characteristics 3m+Shunt motor Characteristic equations2m+ Characteristics 3m

3. If a break test conducted on a dc shunt motor the full load readings are observed as tension on tight side is 9.1kg tension on slake side is 0.8kg total current is 10A supply voltage is 110V speed is 1320 rpm radius of the pulley is 7.5 cm calculate full load efficiency. (10m) (Level-3)

Given data 1m+Formulas 2m+ Torque:3m+ Output 2m+ efficiency 2m

ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY – VJA – 8

II YEAR SEM –I ::II-MID TERM EXAM:: BRANCH: EEE DATE: 15-10-19 MAX: 30M

SUBJECT: EM-I ANSWER ALL THE QUESTIONS DUR: 90 MIN SET-1

1. Draw the exact equivalent circuit of a transformer and derive the equivalent circuits referred to primary and secondary. Describe the various parameters involved in it. (L-1) (10M)

2.a)Why is it preferable to install two or more transformers in parallel than one large unit? (L-2) 5M

b)Explain why parallel operation of transformer is necessary. State the essential and desirable conditions which would be satisfied before two single-phase transformers may be operated in parallel. (L-1) 5M

3.A 500-kVA, 3-phase, 50-Hz transformer has a voltage ratio (line voltages) of 33/11-kV and is delta/star connected. The resistances per phase are : high voltage 35 Ω, low voltage 0.876 Ω and the iron loss is 3050 W. Calculate the value of efficiency at full-load and one-half of fullload respectively (a) at unity p.f. and (b) 0.8 p.f (L-3) 10M

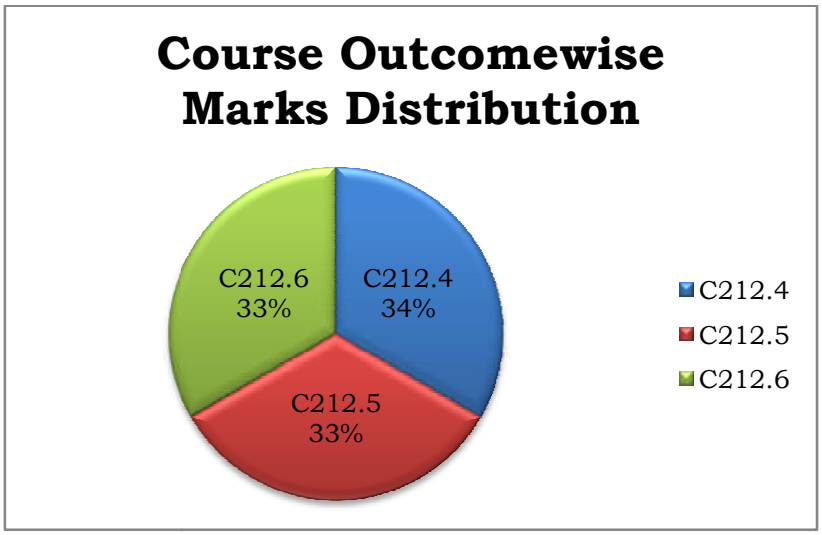
Internal Question Paper Analysis:

Name of the Course: Electrical Machines-I **Year & Semester: II Year I Sem**

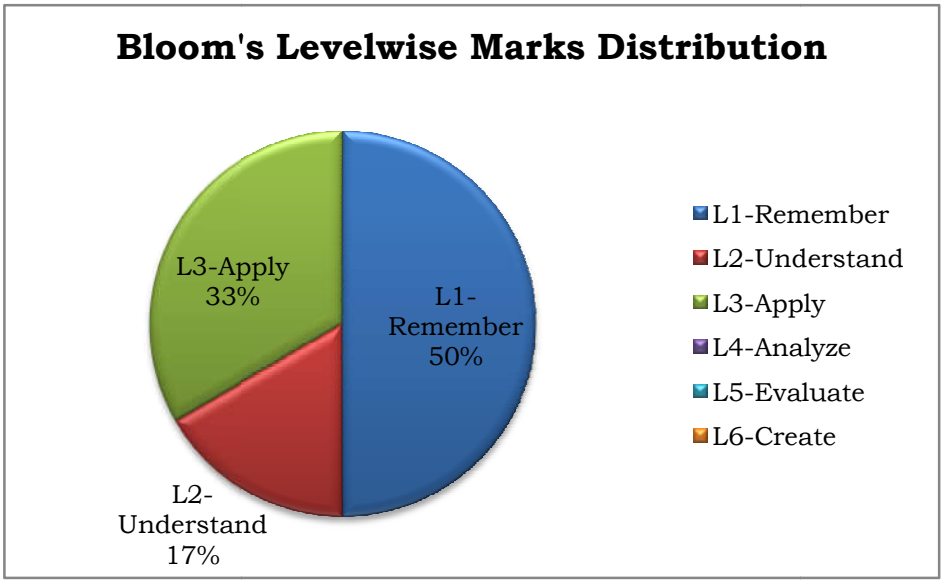
Course Code: C212 **INTERNAL: 2**

Q.No	Question	Marks	CO	TL
1	**1.** Draw the exact equivalent circuit of a transformer and derive the equivalent circuits referred to primary and secondary. Describe the various parameters involved in it.	10	C212.4	L1-Remember
2.a	Why is it preferable to install two or more transformers in parallel than one large unit?	5	C212.5	L2-Understand
2.b	Explain why parallel operation of transformer is necessary. State the essential and desirable conditions which would be satisfied before two single-phase transformers may be operated in parallel.	5	C212.5	L1-Remember
3	A 500-kVA, 3-phase, 50-Hz transformer has a voltage ratio (line voltages) of 33/11-kV and is delta/star connected. The resistances per phase are : high voltage 35 Ω, low voltage 0.876 Ω and the iron loss is 3050 W. Calculate the value of efficiency at full-load and one-half of fullload respectively (a) at unity p.f. and (b) 0.8 p.f	10	C212.6	L3-Apply

CO	Marks	%
C212.4	10	33.33
C212.5	10	33.33
C212.6	10	33.33



BTL	Marks	%
L1-Remember	15	50
L2-Understand	5	16.67
L3-Apply	10	33.33
L4-Analyze		
L5-Evaluate		
L6-Create		



Scheme of Evaluation:

1. Draw the exact equivalent circuit of a transformer and derive the equivalent circuits referred to primary and secondary. Describe the various parameters involved in it. (10M)

Two winding Transformer Diagram 2m+ Representing secondary to primary 3m+Simplifying the circuit 3m+formulas 2m

2. a)Why is it preferable to install two or more transformers in parallel than one large unit?

Advantages of Parallel Operation (5m)

b)Explain why parallel operation of transformer is necessary. State the essential and desirable conditions which would be satisfied before two single-phase transformers may be operated in parallel.(5M)

Necessity of parallel operation 2m+ Conditions for Parallel operation 3m

3. A 500-kVA, 3-phase, 50-Hz transformer has a voltage ratio (line voltages) of 33/11-kV and is delta/star connected. The resistances per phase are : high voltage 35 Ω, low voltage 0.876 Ω and the iron loss is 3050 W. Calculate the value of efficiency at full-load and one-half of fullload respectively (a) at unity p.f. and (b) 0.8 p.f (10M)

Data 1m+Transformation ratio 2m+ equivalent resistance 1m+ Cu losses 1m+ output in kw 1m+ efficiency at full load 2m+ half load 2m

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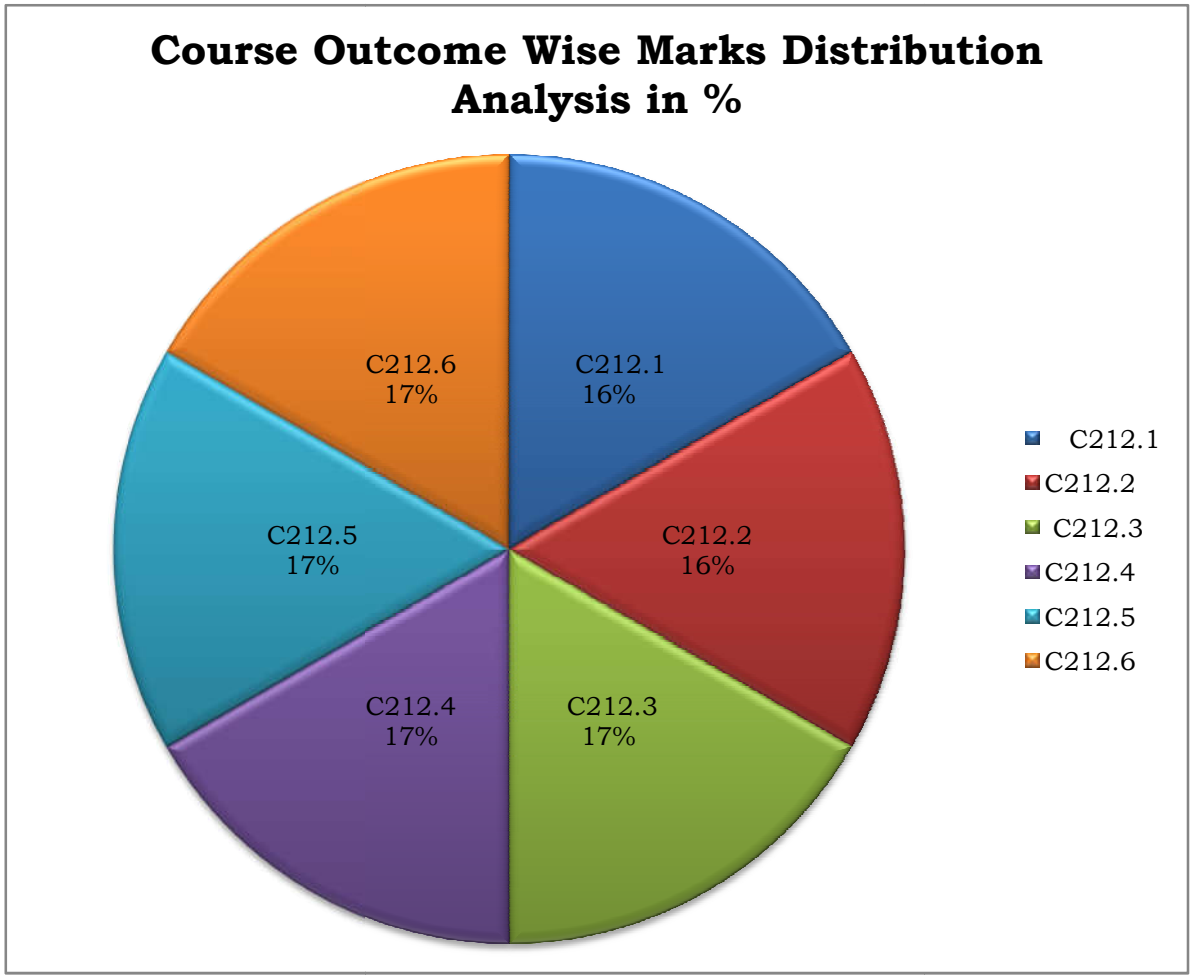
Assignment Question Paper Analysis:

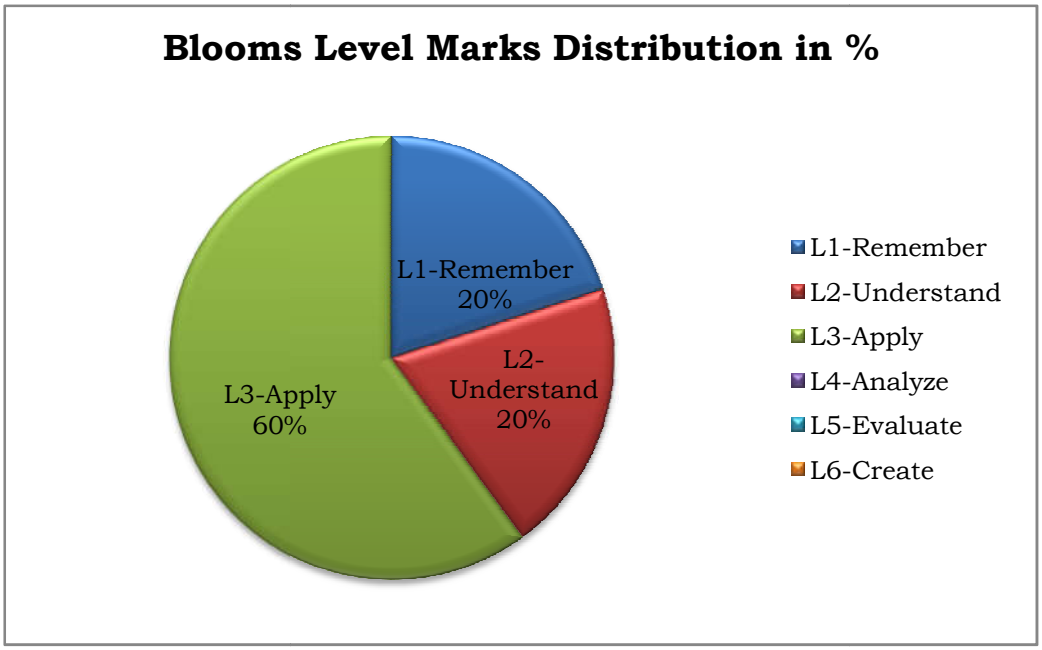
Name of the Course: Electrical Machines-I **Sem Course Code: C212**		**Year & Semester: II Year I** **Assignment Questions**		
Q NO	**Assessment question**	**Marks**	**Connected CO**	**BTL of CO**
A1.1	A 4 Pole,220V DC shunt generator has an armature resistance of 0.5 ohms,field resistance of 110 ohms, delivers a load of 18 amp,having 50 armature slots & 20 conductors per slot and are connected in wave.if the speed of the generator is 1500 rpm find the flux per pole?	**3**	**C212.1**	**L-3 APPLY**
A1.2	Explain the experimental procedure to find critical resistance and speed of a dc Generator?	**2**		**L-1 REMEMBER**
A2.1	A 250V, 4 pole shunt motor has two circuit armature winding with 500 conductors. The armature circuit resistance is 0.25 ohms field resistance is 125 ohms and the flux per pole is 0.02 Wb neglect armature reaction. Find the speed and torque developed if the motor draws 14A from the mains.	**3**	**C212.2**	**L-3 APPLY**
A2.2	Explain the process of Commutation in a DC Machine with Example?	**2**		**L-1 REMEMBER**

A3.1	Explain the Necessity of a starter & explain about 3-Point Starter?	**2**	**C212.3**	**L-1 REMEMBER**
A3.2	If a break test conducted on a dc shunt motor the full load readings are observed as tension on tight side is 9.1kg tension on slake side is 0.8kg total current is 10A supply voltage is 110V speed is 1320 rpm radius of the pulley is 7.5 cm calculate full load efficiency.	**3**		**L-3 APPLY**
A4.1	Draw the exact equivalent circuit of a transformer and derive the equivalent circuits referred to primary and secondary. Describe the various parameters involved in it.	**2**	**C212.4**	**L-2 UNDERSTAND**
A4.2	A 50-kVA, 4,400/220-V transformer has R1 = 3.45 Ω, R2 = 0.009 Ω. The values of reactances are X1 = 5.2 Ω and X2 = 0.015 Ω. Calculate for the transformer (i) equivalent resistance as referred to primary (ii) equivalent resistance as referred to secondary (iii) equivalent reactance as referred to both primary and secondary (iv) equivalent impedance as referred to both primary and secondary (v) total Cu loss, first using individual resistances of the two windings and secondly, using equivalent resistances as referred to each side.	**3**		**L-3 APPLY**
A5.1	A transformer has a primary voltage rating of 11500 volts and secondary voltage rating of 2300 volts. Two windings are connected in series and the primary is connected to a supply of 11500 volts, to act as a step-up auto transformer. Determine the voltage output of the transformer. Question extended : If the two winding transformer is rated at 115 kVA, what will be the kVA raitng of the auto-transformer ?	**3**	**C212.5**	**L-3 APPLY**
A5.2	In an auto-transformer, the power transferred from primary to secondary circuit is partly by conduction and partly by induction. Explain.	**2**		**L-2 UNDERSTAND**
A6.1	A balanced 3-phase load of 150 kW at 1000 V, 0.866 lagging power factor is supplied from 2000 V, 3-phase mains through single-phase transformers (assumed to be ideal) connected in (i) delta-delta (ii) Vee-Vee. Find the current in the windings of each transformer and the power factor at which they operate in each case. Explain your calculations with circuit and vector diagrams.	**3**	**C212.6**	**L-3 APPLY**
A6.2	Explain the conversion of 2–Phase to 3-Phase and vice versa with neat sketches	**2**		**L-2 UNDERSTAND**

CO	MARKS	PERCENTAGE (%)
C212.1	5	16.67
C212.2	5	16.67
C212.3	5	16.67
C212.4	5	16.67
C212.5	5	16.67
C212.6	5	16.67



BTL	Marks	%
L1-Remember	6	20
L2-Understand	6	20
L3-Apply	18	60
L4-Analyze		
L5-Evaluate		
L6-Create		



End Semester Paper Analysis:

Name of the Course: Electrical Machines-1 **Year & Semester: II Year I**

Sem Course Code: C212 **Semester End Paper- SET 1**

	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			SET-1
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	A 6-pole lap wound DC generator has 720 conductors; a flux of 80 mWb/pole is driven at 1000 rpm. Fine the generated e.m.f	**3**	**C211.1**	**APPLY**
1.b	What is a back e.m.f? Why the e.m.f generated in the armature of a DC motor is called back emf	**2**	**C211.2**	**REMEMBER**
1.c	Why is armature control superior to field control scheme in case of a DC shunt motor.	**2**	**C211.3**	**UNDERSTANI**
1.d	Why the main flux in a transformer is remains practically	**2**	**C211.4**	**REMEMBER**

	constant from no load to full load.			
1.e	Why core losses are neglected in short circuit test and copper losses are neglected in open-circuit test in a transformer testing.	**3**	**C211.5**	**REMEMBER**
1.f	What are the features of on load tap changers?	**2**	**C211.6**	**REMEMBER**
2.a	Find expression for magnetic force developed in a doubly-excited translational magnetic system.	**7**	**C212.1**	**UNDERSTAND**
2.b	Explain the construction and principle of operation of DC generator	**7**	**C212.1**	**REMEMBER**
3.a	Explain the mechanical and electrical characteristics of dc cumulative and differential dc motors.	**7**	**C212.2**	**REMEMBER**
3.b	Determine (i) the total torque developed (ii) the useful torque of a 250 V, 4 pole series motor with 782 wave connected conductors developing 8 kW and taking 40 A with a flux per pole of 25 mWb. The armature resistance of the motor is 0.75 ohms.	**7**	**C212.2**	**APPLY**
4.a	Explain the need for conducting separation of losses test on dc machine	**6**	**C212.3**	**REMEMBER**
4.b	In a retardation test on a D.C motor, with its field normally excited, the speed fell from 1525 to 1475 in 25 seconds. With an average load of 1 kW supplied by the armature, the same speed drop occurred in 20 seconds. Find the moment of inertia of the rotating parts in kg.m^2?	**8**	**C212.3**	**APPLY**
5.a	Derive the emf equation of transformer and explain the significance of each term in it.	**7**	**C212.4**	**UNDERSTAND**
5.b	In a 400 V, 50 Hz transformer, the total iron loss is 2300 W. When the supply voltage and the frequency reduced to 200 V and 25 Hz respectively the corresponding loss is 800 W. Calculate the eddy current loss at normal voltage and frequency.	**7**	**C212.4**	**APPLY**
6.a	Explain Sumpner's test on single phase transformer and also list its advantages?	**8**	**C212.5**	**REMEMBER**
6.b	A 2-winding 10 kVA, 440/110 V transformer is reconnected as a step-down 550/440 V autotransformer. Compare volt-ampere rating of the autotransformer with that of original 2-winding transformer. Calculate power transferred to the load: (i) inductively (ii) conductively.	**6**	**C212.5**	**APPLY**
7.a	What is the total load capacity of V-V bank as compared with a delta-delta bank?	**7**	**C212.6**	**REMEMBER**
7.b	A balanced 3-phase, 100 kW load at 400V and 0.8 p.f. lag is to be obtained from a balanced 2-phase, 1100V lines. Determine the kVA rating of each unit of the Scott-connected transformer	**7**	**C212.6**	**APPLY**
	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			**SET-2**
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	Why magnetic field systems are are employed in practical electromechanical energy conversion devices rather than electric field systems.	**2**	**C211.1**	**REMEMBER**
1.b	Draw the different characteristics of dc shunt motors	**2**	**C211.2**	**UNDERSTAND**

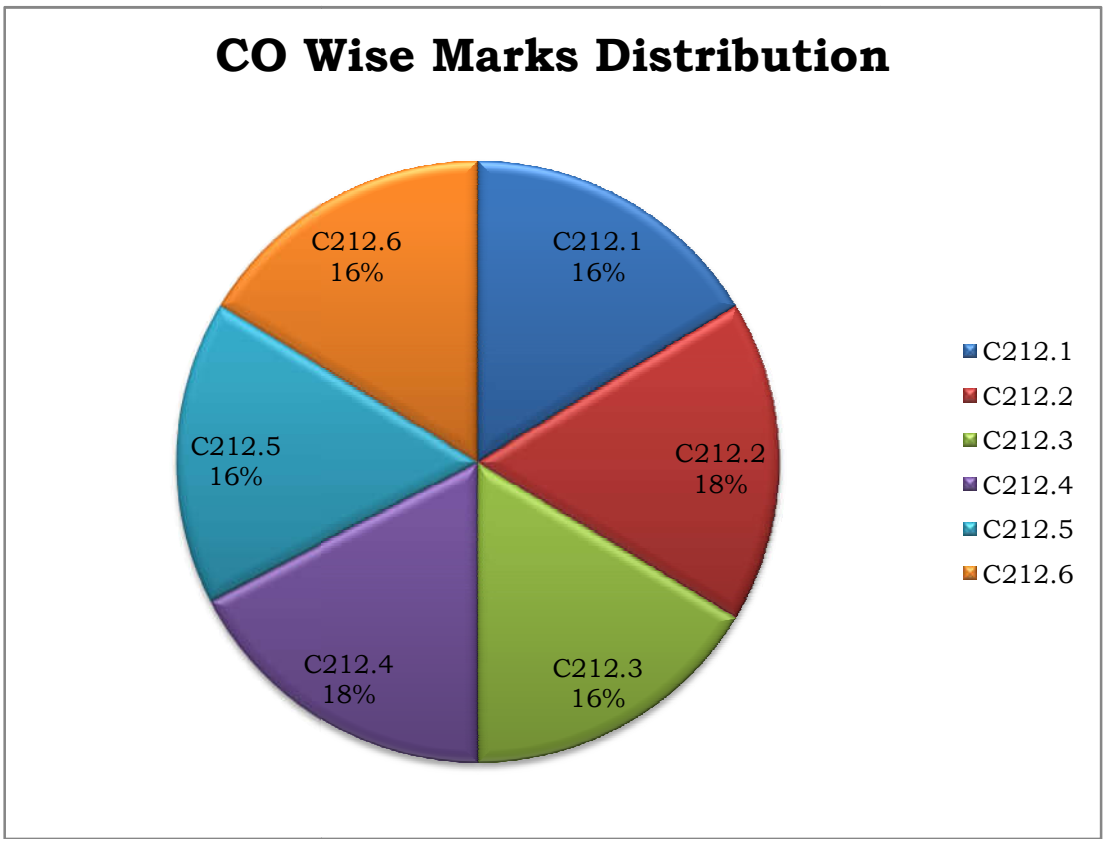
1.c	What precautions are taken during starting of DC shunt and series motors and why?	**2**	**C211.3**	**REMEMBER**
1.d	On what factors does the eddy current loss depend? Why this loss can be assumed to be constant	**3**	**C211.4**	**REMEMBER**
1.e	Write conditions that must be fulfilled before two transformers can be operated successfully in parallel?	**3**	**C211.5**	**REMEMBER**
1.f	What are the advantages with Scott connection?	**2**	**C211.6**	**REMEMBER**
2.a	Explain briefly about singly-excited and doubly-excited systems with suitable examples.	**7**	**C212.1**	**REMEMBER**
2.b	Derive the expression for generated e.m.f in a DC generator. Discuss the factors affecting the generated e.m.f	**7**	**C212.1**	**UNDERSTAND**
3.a	Explain speed-current, torque-current and speed-torque characteristics of DC compound motor.	**7**	**C212.2**	**UNDERSTAND**
3.b	DC motor connected to a 460V supply has an armature resistance of 0.25 ohm. Calculate the value of back e.m.f when the armature current is 120A and the value of armature current when the back e.m.f is 447.4V?	**7**	**C212.2**	**APPLY**
4.a	With a neat diagram, explain the operation of a 4-point starter. Discuss the advantages of 4-point starter over 3-point starter7	**6**	**C212.3**	**REMEMBER**
4.b	Hopkinson's test on two shunt machines gave the following results for full load: line voltage 250 V, line current excluding field current 50 A; motor armature current 380 A; field currents 5 A and 4.2 A. Calculate the efficiency of each machine. The armature resistance of each machine = 0.02 Ω.	**8**	**C212.3**	**APPLY**
5.a	With the help of relevant expressions explain how the iron loss is varied by the variation of supply voltage and frequency?	**7**	**C212.4**	**REMEMBER**
5.b	A 100 kVA, 2000/200 V, 50 Hz distribution transformer has core loss of 750 W at rated voltage and copper loss of 1500 W at full load. It has the following load cycle: Determine the all-day efficiency of the transformer?	**7**	**C212.4**	**APPLY**
6.a	Develop the exact equivalent circuit of a 1-phase transformer. From this derive the approximate and simplified equivalent circuits. State the various assumptions made?	**8**	**C212.5**	**UNDERSTAND**
6.b	Two similar 200 kVA, 1-phase transformers gave the following results when tested by back-to-back method: W_1 in the supply line, 4kW, W_2 in the primary series circuit, when full-load current circulated through secondries, 6 kW. Calculate efficiency of each transformer	**6**	**C212.5**	**APPLY**
7.a	Distinguish between off load and on load tap changing	**7**	**C212.6**	**UNDERSTAND**

	transformer.			
7.b	Two single phase transformers are supplied at 250V from a 6600 V, 3-phase system through a pair of Scott-connected transformers. If the load on the main transformer is 85 kW at 0.9 p.f. lagging and that on teaser transformer is 69 Kw at 0.8 p.f. lagging, find the values of line currents on the 3-phase side. Neglect the magnetizing and core loss currents in the transformers?	**7**	**C212.6**	**APPLY**
	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			**SET-3**
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	What is meant by co-energy? What is its physical significance?	**2**	**C211.1**	**REMEMBER**
1.b	A DC shunt motor develops an open circuit voltage of 250 V at 1500 rpm. Find the developed torque for an armature current of 10 A.	**3**	**C211.2**	**APPLY**
1.c	Why Swinburn's test cannot be performed on a DC series motor?	**2**	**C211.3**	**UNDERSTAND**
1.d	What is meant by all-day efficiency of a power transformer and why it is lower than the commercial efficiency?	**2**	**C211.4**	**REMEMBER**
1.e	What is an auto–transformer? What advantages are possessed by autotransformer?	**3**	**C211.5**	**REMEMBER**
1.f	What are the salient features of star-star connected three-phase transformer?	**2**	**C211.6**	**REMEMBER**
2.a	What are the salient features of star-star connected three-phase transformer?	**7**	**C212.1**	**REMEMBER**
2.b	A six pole lap wound dc armature has 70 slots with 20 conductors / slot. The ratio of pole arc to pole pitch is 0.68. The diameter of bore of the pole shoe is 0.46 m. The length of the pole shoe is 0.3 m. If the air gap flux density is 0.3 Wb/m^2 and the e.m.f induced in the armature is 500 V, find the speed at which it runs.	**7**	**C212.1**	**APPLY**
3.a	Explain the concept of armature reaction in DC motors.	**7**	**C212.2**	**REMEMBER**
3.b	A 4 pole, 240V, wave connected shunt motor gives 1118 kw when running at 1000 r.p.m and drawing armature and field currents of 50A and 1 A respectively. It has 540 conductors. Its resistance is 0.1 ohm. Assuming a drop of 1V per brush, find total torque, useful torque, useful flux per pole, rotational losses and efficiency?	**7**	**C212.2**	**APPLY**
4.a	Explain the Hopkinson's test for determination of efficiency of shunt machines.	**6**	**C212.3**	**REMEMBER**
4.b	A 220V D.C shunt motor at no load takes a current of 2.5A. The resistances of armature and the shunt field are 0.6 ohm and 210	**8**	**C212.3**	**APPLY**

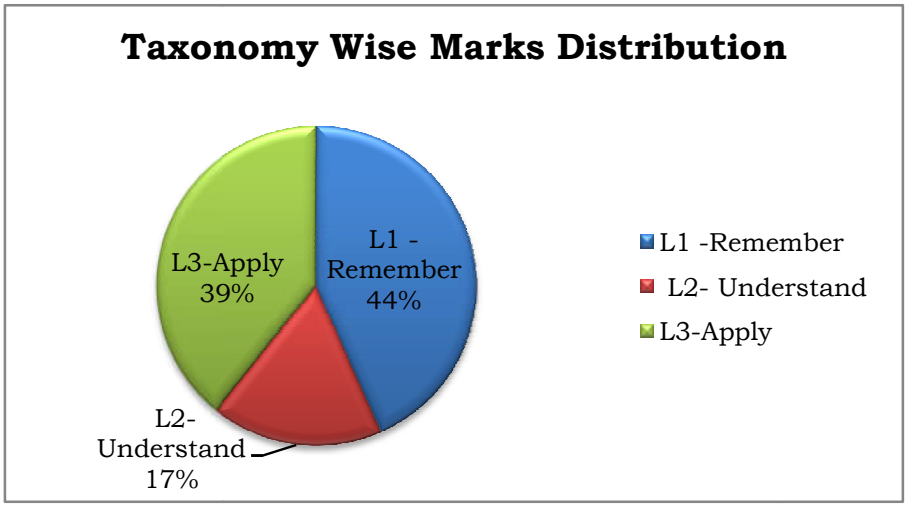
	ohm respectively. Estimate the efficiency of the motor when the input current is 20 A. State the assumptions made?			
5.a	Explain why transformer rating is given in KVA only	7	C212.4	REMEMBER
5.b	The primary and secondary windings of a 40 kVA, 6600/250 V single phase transformer have resistances of 10 Ω and 0.02 Ω respectively. The total leakage reactance is 35 Ω as referred to the primary winding. Find full load regulation at a p.f. of 0.8 lagging.	7	C212.4	APPLY
6.a	In an auto-transformer, power transferred from primary to secondary circuit is partly by conduction and partly by induction. Explain.	8	C212.5	REMEMBER
6.b	ollowing readings were obtained from O.C. and S.C. tests on a 8 kVA, 400/120V, 50 Hz transformer: O.C. Test: (l.v. side) : 120 V; 4 A; 75 W S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W Obtain i) Voltage regulation and efficiency for 0.8 lagging power factor load, and ii) The efficiency at half full – load and 0.8 power factor load	6	C212.5	APPLY
7.a	Explain the purpose of using tertiary winding in three-winding transformers.	7	C212.6	REMEMBER
7.b	Two single phase electric furnaces A and B are supplied at 220 V from a 3- phase 1100 V supply by means of a Scott connected transformer combination. If the total output is 600 kW at 0.6 power factor lagging determine currents in the winding and transformation ratio of each transformer.	7	C212.6	APPLY
	II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019			**SET-4**
Q.No	**Question**	**Marks**	**CO**	**TL**
1.a	What is the function of commutator in a DC machine?	**3**	**C211.1**	**REMEMBER**
1.b	What is the condition for maximum power developed in dc motors and what is the efficiency of the motor at that condition.	**3**	**C211.2**	**UNDERSTAND**
1.c	Why is the starting current high in a DC motor?	**2**	**C211.3**	**UNDERSTAND**
1.d	Why are iron or core losses assumed to remain constant from no load to full load in a power transformer?	**2**	**C211.4**	**REMEMBER**
1.e	What is the typical information that can be had by performing OC and SC tests on a single phase transformer?	**3**	**C211.5**	**REMEMBER**
1.f	What is the need of tap changers in transformers?	**2**	**C211.6**	**REMEMBER**
2.a	Show that torque developed in a doubly excited system is equal to the rate of increase of field energy with respect to displacement at constant current.	**7**	**C212.1**	**REMEMBER**

2.b	Explain about the open circuit characteristics of a DC generator. Write the necessary equations?	**7**	**C212.1**	**UNDERSTAND**
3.a	Discuss in detail about the significance of back e.m.f that is produced in a DC motor?	**7**	**C212.2**	**REMEMBER**
3.b	A six pole, lap-wound 400 V series motor has the following data: Number of armature conductors=920, flux per pole=0.045 Wb, total motor resistance = 0.6 ohms and frictional losses = 2 kW. If the current taken by the motor is 90 A, find: (i) total torque (ii) useful torque at the shaft (iii) power output.	**7**	**C212.2**	**APPLY**
4.a	Explain the Retardation test to estimate the rotational losses in a DC machine	**6**	**C212.3**	**REMEMBER**
4.b	In a brake test on a DC shunt motor, the load on one side of the brake band was 35 kg and the other side 5kg. The motor was running at 1300 rpm; its input being 70 A at 420 V DC. The pulley diameter is 1 m. Determine the torque, output of the motor and the efficiency of the motor.	**8**	**C212.3**	**APPLY**
5.a	Define voltage regulation of a transformer and derive conditions for i) zero regulation ii) maximum regulation.	**7**	**C212.4**	**REMEMBER**
5.b	A single-phase transformer working at unity power factor has an efficiency of 90% at both half load and at the full-load of 500W. Determine the efficiency at 75% full load and the maximum efficiency.	**7**	**C212.4**	**APPLY**
6.a	Derive expressions for load shared by two transformers operating in parallel when no-load voltages of these transformers are not equal. What will be the load distribution if the voltage ratio is exactly equal?	**8**	**C212.5**	**APPLY**
6.b	A 400/100 V, 5 kVA, single-phase two winding transformer is to be used as an auto-transformer to supply 400 V from a 500 V voltage source. When tested as a two winding transformer at rated load and 0.8 p.f. lagging, its efficiency was found to be 0.95. (i) Determine its kVA rating as an Auto-transformer. (ii) Find its efficiency as an auto-transformer at rated load and at 0.8 p.f. lagging.	**6**	**C212.5**	**APPLY**
7.a	Explain about three phase to two phase transformation using Scott connection.	**7**	**C212.6**	**REMEMBER**
7.b	What are distinguishing features of Y-Y, Y-Δ, Δ-Y and Δ- Δ three phase connections? Compare their advantages and disadvantages?	**7**	**C212.6**	**UNDERSTAND**

CO	Marks	%
C212.1	16	16.3265
C212.2	17	17.3469
C212.3	16	16.3265
C212.4	17	17.3469
C212.5	16	16.3265
C212.6	16	16.3265

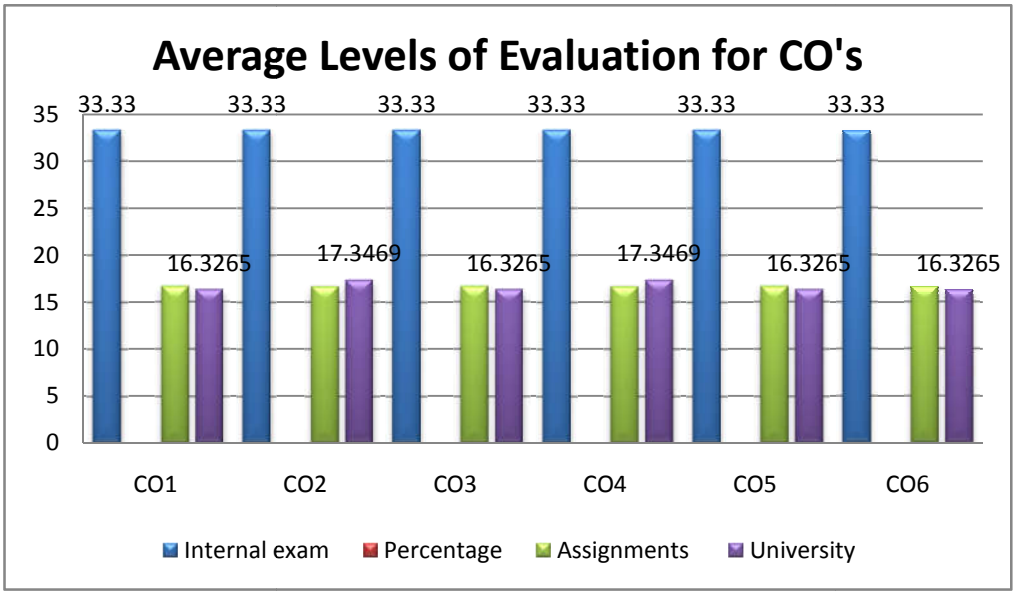


Overall (4 Sets)			Average of 4 Sets		
TL	**Marks**	**%**	**TL**	**Marks**	**%**
L1 -Remember	170	43.36735	L1 -Remember	42.5	43.36735
L2- Understand	68	17.34694	L2- Understand	17	17.34694
L3-Apply	154	39.28571	L3-Apply	38.5	39.28571
L4-Analyze			L4-Analyze		
L5-Evaluate			L5-Evaluate		
L6-Create			L6-Create		



Average levels of evaluation for the COs :

COs	CO1	CO2	CO3	CO4	CO5	CO6
Internal exam Percentage	33.33	33.33	33.33	33.33	33.33	33.33
Assignments	16.67	16.67	16.67	16.67	16.67	16.67
University	16.3265	17.3469	16.3265	17.3469	16.3265	16.3265



Average levels of Taxonomy evaluation:

COs	L-1 Remember	L-2 Understand	L-3 Apply	Analyze	Evaluate	Create
Internal exam	41.667	25	33.33	-	-	-
Assignments	20	20	60			
University	43.36	17.37	39.28