SPRING 2014/3015

POWE 532 – SPECIAL MACHINES

Curricular Area	Electrical Engineering/ power and mechanical	
Type of Course	Core (2 crd)	
Prerequisites by Courses	POWE 532	
Instructors	M. Tarnini m.tarnini@bau.edu.lb Engineering Building – G111 Phone Ext: 3404	
Office Hours	Monday 9:00→1:00 WED 9:00 →10:00 and 1:00 → 2:00 TH 11→3:00	
Textbook	ELEC. MACHINE AND DRIVE WILDI	
Reference Books	Power Elec. Rashide	
Topics	*Subjects covered*	*Week*
	• Revision of basic 3 PHASE induction motor	1
	Electric construction of single phase induction motor torque-speed characteristics.	2
	Illustrations of main and auxiliary windings. performance using simulation software	3
	Reference-frame theory or revolving flux theory in single phase induction motors.	4
	Calculation of Power developed in single phase single winding induction motor. Illustration and operation of single phase induction motor efficiently	5
	No load and blocked rotor tests. Electric equivalent sketch and its significance.	6
	Effect of losses in single phase single winding induction motor. starting methods of different types of induction motors	7
	Construction operation and equivalent circuit of Universal motor with phasor diagram. Universal motors application and examples	8
	Construction operation and equivalent circuit of Reluctance motor with phasor diagram. application and examples	9
	Construction characteristics and working of Hysterisis motor with its torque-speed characteristics	10

	Sylsen motor electric diagram principle of functioning applications and connections	11
	Explain the working of Permanent Magnet AC motor and its application. **Construction** of Permanent Magnet DC motor. Block diagram of vector control of PMDC motor	12
	Construction operation of simple 3 coils Stepper motors. Torque speed characteristics. Effect of inertia and effects of loads	13
	Start stop of stepper motor and stepping rates. Slew speed and ramping. Types of stepper motors. And application of each type	14
	Brush less DC motor construction operation equivalent circuit and its applications	15

Assessment:

Assessment:	Dates	Weighing
Midterm_1	Around 20-3-2016	20%
Midterm_2	Around 4-5-2016	20%
lab		20%
Final Exam	To be set later by BAU registrar	40%
Total	20-5-2016	100%

	Learning Outcome (or Course Objectives)	Level of Course Contribution to Outcome+					Performance measure*
1	**Ability** to **analyze** torque-speed characteristics of single-phase motors. **Illustrations** of main and auxiliary windings. Analyze switched reluctance motor and brushless DC motor • Students will be able to **analyze** the basic of stepper motors and drives. Students will be able to **apply** reference-frame theory to the analysis of induction motors. Students will be able to **predict** single phase motor drive performance using simulation software	1	2	3	4	5	Presentations and HW1
2	**Describe** working **principle** of single p hase induction motor. **Analyze** Single p hase induction motor **Construction**, **wo rking principle**, rotating field. **Calcula tion** of Power developed in single phase single winding induction motor. **Illustr ate** how to operate single phase inducti on motor efficiently, reluctance machin es efficiently and AC special machines efficiently	1	2	3	4	5	Presentations
3	**Describe** no load and blocked rotor test with **sketches** and its **significance**. **Explain** the effect of losses in single phase single winding induction motor. **Define** the starting methods of different types of induction motors. **Differentiate** between different types of single phase induction motors.	1	2	3	4	5	Presentation and H.W 2
4	**Define** rotor frequency, rotor emf, current and rotor power. **Calculation** and **formulation** of losses and efficiency of single phase induction motor. **Explain** the power slip characteristic of the induction machine. **Illustrate** the equivalent circuit including forward and backward parts and approximate equivalent circuit. Illustrate the phasor diagram of	1	2	3	4	5	Project; HW 3 Midterm

	different types of induction machines						
5	**Explain** the working of Universal motor with phasor diagram. **Explain** the working of Reluctance motor with its characteristics. **Explain** the working of Stepper motor with its characteristics. **Differentiate** the working **principles** of various types of stepper motors. **Explain** the working of Hysterisis motor with its torque-speed characteristics. **Explain** the working of linear induction motor and its application. Explain the working of Permanent Magnet AC motor and its application. **Construction** of Permanent Magnet DC motor and its application	1	2	3	4	5	Presentations, HW and FINAL EXAM Test

[+] 1 = No contribution to the outcome; 5 = Major contribution to the outcome

[*] Example: Class performance or grades on a related question in an exam(s), quiz, homework, project, oral presentation, etc. to quantify the level of course contribution to outcome.