Engineering Program

Specialization	**Hybrid Vehicles Technology**
Course Number	**20220241**
Course Title	**Electric Propulsion systems**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

وصف المادة الدراسية:

- The 'Brushed' DC Electric Motor, Torque speed characteristics, magnetic field of strength, voltage generated (back EMF), Controlling the brushed DC motor, DC motor efficiency, Motor losses and motor size, electric motors as brakes, Switching devices , Step-down or 'buck' regulators , Step-up or 'boost' switching regulator , Single-phase inverters , Three-phase phase inverter circuit ,Brushless electric motors, Switched reluctance motors , induction motor .

أهداف المادة الدراسية:

Upon the completion of the course, the student will be able to:

1. Study the Brushed' DC Electric Motor
2. Study the Torque speed characteristics .
3. Study the DC motor efficiency .
4. Study the Brushless Electric Motors.
5. Study the Switched reluctance motors
6. Study The induction motor

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الوصف العام:

رقم الوحدة	اسم الوحدة	محتويات الوحدة	الزمن
1.	**Introduction**	concerns about the environment, particularly noise and exhaust emissions, coupled to new developments in batteries and fuel cells may swing the balance back in favor of electric vehicles.	**1 week**
2.	**The 'Brushed' DC Electric Motor**	▪ Operation of the basic DC motor ▪ Torque speed characteristics ▪ Controlling the brushed DC motor ▪ Providing the magnetic field for DC motors ▪ DC motor efficiency ▪ Motor losses and motor size ▪ Electric motors as brakes ▪	**2 weeks**
3.	DC Regulation and Voltage Conversion	▪ Switching devices ▪ Step-down or 'buck' regulators ▪ main energy losses in the step-down chopper circuit ▪ Linear regulator circuit ▪ Step-up or 'boost' switching regulator ▪ operation of a switch mode boost regulator ▪ Graph of voltage against current for a fuel cell with a step-up chopper circuit Voltage dividers	**2 week**

4.	Single-phase inverters	▪ H-bridge inverter circuit for producing single phase alternating current ▪ Current/time graph for a square wave switched single-phase inverter ▪ principle of pulse width modulation ▪ Typical voltage/time graph for a pulse modulated inverter .	**2 week**
5.	Three-phase inverter circuit	▪ Switching pattern to generate three-phase alternating current .	**1 week**
6.	Brushless Electric Motors	▪ Introduction ▪ The brushless DC motor ▪ basis of operation of the brushless DC motor ▪ arrangement of three coils on the stator of a BLDC motor	**2 weeks**
7.	Switched reluctance motors	▪ principle of operation of the switched reluctance motor ▪ operation of an SR motor with a four salient pole ▪ peak efficiency of the SR motor ▪ Parallel Capacitors ▪ Capacitors in DC Circuits Capacitors in AC Circuits	**2 weeks**
8.	induction motor	▪ principle of operation of the three-phase induction motor ▪ torque / speed curve for an induction motor ▪ how a rotating magnetic field is produced within an induction motor	**2 weeks**

9.	**Motor Cooling, Efficiency, Size and Mass**	▪ Improving motor efficiency ▪ efficiency map ▪ Motor mass ▪ Specific power of electric motor at different power .	**2 weeks**

طرق التقييم المستخدمة:

الامتحانات	نسبة الامتحان من العلامة الكلية	التاريخ
الامتحان المتوسط	40%	التاريخ: / /
أعمال الفصل	10%	التاريخ: / /
الأمتحانات النهائية	50%	التاريخ: / /

طرق التدريس:

- ❖ Lecture

الكتب و المراجع:

الكتاب المقرر:

1. **Electric Vehicle Technology Explained**
James Larminie
Oxford Brookes University, Oxford, UK
John Lowry
Acenti Designs Ltd., UK.
Copyright 2003 John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England
Telephone (+44) 1243 779777

المراجع:

1. ModernElectric, Hybrid Electric, *and* FuelCellVehicle

Fundamentals,Theory,andDesign

SECOND EDITION

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