



## Table of Courses

### The Course Code in English

	Departement	English Abbreviation	Arabic Abbreviation
1	Architecture Engineering	AR	هع
2	Automotive & Locomotive Eng.	AT	هس
3	Civil Engineering	CV	هد
4	Communication Engineering	EC	هك
5	Electric Power Engineering	EP	قك
6	Human Sciences	HM	انس
7	Mechanical Design Engineering	MD	هت
8	Mechanical power Engineering	MP	هو
9	Physical & Engineering Mathematics	BS	فر
10	Production Engineering	MR	ها

### Course Coding Key

Departement to which the course belongs	No. of Departement in which the Student is Registered	The Study Year	Semester in which the Course is taught 1; 2 (3 for continuouse courses)	Serial no of course within the semester	Serial no of elective course

### Numbering of Student Departements

- 0 preparatory Year
- 1 Mechanical Power Eng. Dept
- 2 Automotive & Locomotive Eng. Dept.
- 3 Architecture Dept.
- 4 Civil Eng. Dept.

**Table No. 1** **Preparatory Year** **Groups A & B**

Code Symbol	The Course	First Term									Second Term									Course Grade		
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration			
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written				
<b>First Term</b>																						
BS 0011	Mathematics (1)(A)	4	2	-	6	50	-	-	100	3												150
BS0012	Physics (1) (A)	4	1	1	6	30	30	-	90	4												150
BS 0033	Mechanics (1)*	2	1	1	4	30	20	-	-	-	2	2	-	4	30	-	-	120	3		200	
MD 0034	Eng. Drawing & Projection*	1	3	-	4	40	-	-	-	-	2	4	-	6	60	-	-	150	4		250	
CS 0015	Computer & Programming	2	-	2	4	20	20	-	60	2												100
BS 0016	Chemistry	2	-	2	4	20	20	-	60	2												100
HM 0017	English Technical Language (1)	-	2	-	2	15	-	-	35	2												50
<b>Second Term</b>																						
BS 0021	Mathematics (1)(B)										4	3	-	7	75	-	-	100	3		175	
BS0022	Physics (1) (B)										4	2	1	7	30	30	-	90	4		175	
MP 0023	Production Technology										4	-	2	4	20	20	-	60	3		100	
HM 0024	Introduction to Eng. Sciences										4	-	-	2	10	-	-	40	2		50	
		15	9	6	30						16	11	3	30								
																			<b>Total Sum of Grades</b>		<b>1500</b>	

- Notes :**
1. The symbol (\*) means a continuous course that has one exam to be held at the end of the second term & also the delivery of the class grades
  2. Courses divided into parts (A) & (B) are considered as **One** continuous course
  3. Students of the preparatory year are required to carry out – within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year

**Table No. 2** **Preparatory Year** **Group C**

Code Symbol	The Course	First Term									Second Term									Course Grade		
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration			
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written				
<b>First Term</b>																						
BS 0011	Mathematics (1)(A)	4	2	-	6	50	-	-	100	3											150	
BS0012	Physics (1) (A)	4	1	1	6	30	30	-	90	4											150	
BS 0033	Mechanics (1)*	2	1	1	4	30	20	-	-	-	2	2	-	4	30	-	-	120	3	200		
MD 0034	Eng. Drawing & Projection*	1	3	-	4	40	-	-	-	-	2	4	-	6	60	-	-	150	4	250		
MP 0015	Production Technology	2	-	2	4	20	20	-	60	2											100	
BS 0016	Chemistry	2	-	2	4	20	20	-	60	2											100	
HM 0017	English Technical Language (1)	-	2	-	2	15	-	-	35	2											50	
<b>Second Term</b>																						
BS 0021	Mathematics (1)(B)										4	3	-	7	75	-	-	100	3	175		
BS0022	Physics (1) (B)										4	2	1	7	30	30	-	90	4	175		
CS 0023	Computer & Programming										2	-	2	4	20	20	-	60	3	100		
HM 0024	Introduction to Eng. Sciences										2	-	-	2	10	-	-	40	2	50		
		15	9	6	30						16	11	3	30						<b>Total Sum of Grades</b>		<b>1500</b>

- Notes :**
1. The symbol (\*) means a continuous course that has one exam to be held at the end of the second term & also the delivery of the class grades
  2. Courses divided into parts (A) & (B) are considered as **One** continuous course
  3. Students of the preparatory year are required to carry out – within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year

**Table No. 3** **First Year** **Department of Mechanical Power Eng.**

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
BS 1111	Mathematics(2)	4	2	-	6	50	-	-	100	3										150
BS 1112	Physics (2)	2	-	2	4	20	20	-	60	3										100
MR 1113	Production Eng.	2	-	2	4	20	20	-	60	3										100
MD 1114	Mechanical Drawing	2	4	-	6	60	-	-	90	4										150
MD 1115	Mechanics & Strength of Materials	4	1	1	6	30	30	-	90	3										150
EP 1116	Electrical Eng.	2	2	-	4	30	-	-	70	3										100
	Practical Training*	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	50
<b>Second Term</b>																				
MP 1121	Fluid Mechanics(1)										4	-	2	6	30	-	30	90	3	150
MP 1122	Thermodynamics(1)										4	-	2	6	30	-	30	90	3	150
BS 1123	Computer Applications & Programming										2	-	2	4	20	-	30	50	2	100
MD 1124	Stress Analysis										4	-	2	6	50	-	-	100	3	150
MD 1125	Science & Eng. Of Materials										2	-	2	4	30	-	-	70	3	100
HM 1126	Technical English Lang.(2)										-	2	-	2	15	-	-	35	2	50
		16	9	5	30						16	2	10	30						
																	<b>Total Sum of Grades</b>		<b>1500</b>	

**Notes :**

Students of the preparatory year are required to carry out –within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year

Table No. 4

Second Year

Department of Mechanical Power Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
BS 1211	Numerical Analysis	2	2	-	4	30	-	-	70	3										100
MP 1212	Thermodynamics(2)	4	-	2	6	30	-	30	90	3										150
MD 1213	Theory of Machines	4	2	-	6	60	-	-	90	3										150
MP 1214	Fluid Mechanics (2)	4	-	2	6	30	-	30	90	3										150
EC 1215	Electronic Eng.	2	2	-	4	30	-	-	70	3										100
HM 1216	Technical Reports	2	2	-	4	30	-	-	70	3										100
<b>Second Term</b>																				
MD 1221	Machine Elements Design										2	4	-	6	60	-	-	90	4	150
EP 1222	Electrical machines										2	2	-	4	30	-	-	70	3	100
MP 1223	Heat Transfer										4	-	2	6	30	-	30	90	3	150
MP 1224	Eng. Measurements										4	-	2	6	30	-	30	90	3	150
MP 1225	Mechanical Power Control Systems										4	-	2	6	30	-	30	90	3	150
HM 1226	Industrial & Eng. Legislations										2	-	-	2	-	10	-	40	2	50
		18	8	4	30						18	6	6	30						
																<b>Total Sum of Grades</b>		<b>1500</b>		

**Table No. 5 Third Year Department of Mechanical Power Eng.**

Code Symbol	The Course	First Term									Second Term									Course Grade		
		hours per Weak				Grades' Distribution				Exam Duration	hours per Weak				Grades' Distribution				Exam Duration			
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written				
<b>First Term</b>																						
MP 1311	Heat & Mass Transfer	2	-	2	4	20	-	20	60	3												100
MP 1312	Fundamentals of Combustion Techn.	4	-	2	6	30	-	30	90	3												150
MP 1313	Refrigeration & Air-Conditioning	4	-	2	6	30	-	30	90	3												150
MD 1314	Mechanical Vibration	2	2	-	4	30	-	-	70	3												100
MP 1315	Hydraulic & Pneumatic Control	4	-	2	6	30	-	30	90	3												150
*1316xE	Elective Course(1)	2	2	-	4	30	-	-	70	3												100
<b>Second Term</b>																						
MP 1321	Internal Combustion Engines(1)										4	-	2	6	30	-	30	90	3		150	
MD 1322	Machines Design										2	4	-	6	60	-	-	90	4		150	
MP 1323	Mech. Power Labs.(1)										-	-	4	4	20	-	20	60	2		100	
MP 1324	Gas Dynamics										4	-	2	6	30	-	30	90	3		150	
HM 1325	Environmental Sciences										2	2	-	4	30	-	-	70	2		100	
*1326xE	Elective Course(2)										2	2	-	4	30	-	-	70	3		100	
		18	4	8	30						14	6	8	28								
																			<b>Total Sum of Grades</b>		<b>1500</b>	

- Notes :**
1. The symbol (x) indicates the code no. of the elective course
  2. The symbol (\*) indicates the scientific department to which belongs the elective course : MP: Mech. Power Eng.; AT: Autom. & Loc. Eng.; MD: Mech. Design Eng.

Table No. 6

Forth Year

Department of Mechanical Power Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade	
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration		
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written			
<b>First Term</b>																					
MP 1411	Internal Combustion Engines(2)	4	-	2	6	30	-	30	90	3											150
MP 1412	Thermal Turbo-Machinery	4	-	2	6	30	-	30	90	3											150
MP 1413	Mech. Power Labs.(2)	-	-	4	4	30	-	20	50	2											100
*1414xE	Elective Course(3)	2	2	-	4	30	-	-	70	3											100
*1415xE	Elective Course(4)	2	2	-	4	30	-	-	70	3											100
MP 1436	Graduation Project	-	4	-	4	50	-	-	-	-	-	4	-	4	50	-	100	-	Discussion	200	
HM 1417	Applied Environmental Sciences	2	-	-	2	10	-	-	40	2											50
<b>Second Term</b>																					
MP 1421	Power Plants & Their Economics										4	-	2	6	30	-	30	90	3	150	
MP1422	Hydraulic Machines & their Plants										4	-	2	6	30	-	30	90	3	150	
MP 1423	Thermal Equipments										2	2	-	4	30	-	-	70	3	100	
*1424xE	Elective Course(5)										2	2	-	4	30	-	-	70	3	100	
*1425xE	Elective Course(6)										2	2	-	4	30	-	-	70	3	100	
HM 1426	Eng. Economics & Management										2	-	-	2	10	-	-	40	2	50	
		14	8	8	30						16	10	4	30							
																	<b>Total Sum of Grades</b>		<b>1500</b>		

- Notes :**
1. The symbol (x) indicates the code no. of the elective course
  2. The symbol (\*) indicates the scientific department to which belongs the elective course : MP: Mech. Power Eng.; AT: Autom. & Loc. Eng.; MD: Mech. Design Eng.



Table No. 7

First Year

Department of Automotive &amp; Locomotive Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Weak				Grades' Distribution				Exam Duration	hours per Weak				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First term</b>																				
BS 2111	Mathematics (2)	4	2	-	6	50	-	-	100	3										150
BS 2112	Physics (2)	2	1	1	4	20	20	-	60	3										100
MD 2113	Structural Analysis	2	2	-	4	30	-	-	70	3										100
MD 2134	Mechanical Drawing	2	2	-	4	40	-	-	-	-	2	2	-	4	40	-	-	120	4	200
BS 2115	Mechanics (2)	2	2	-	4	30	-	-	70	3										100
MD 2116	Strength of Materials	2	-	2	4	20	20	-	60	3										100
EP 2117	Electrical Eng.	2	2	-	4	30	-	-	70	3										100
	Practical Training	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	50
<b>Second Term</b>																				
MP 2121	Thermodynamics(1)										4	-	2	6	30	-	30	90	3	150
BS 2122	Computer Applications & Programming										2	2	2	6	30	-	30	90	3	150
MR 2123	Production Eng.										4	-	2	6	30	30	-	90	3	150
MD 2124	Science & Eng. of Materials										2	-	2	4	20	20	-	60	3	100
HM 2125	Technical English Language (2)										2	-	-	2	10	-	-	40	2	50
		15	12	3	30						16	4	8	30						
																	<b>Total Sum of Grades</b>		<b>1500</b>	

**Notes :**

Students of the preparatory year are required to carry out – within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year

Table No. 8

Second Year

Department of Automotive &amp; Locomotive Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Weak				Grades' Distribution				Exam Duration	hours per Weak				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
MP 2211	Heat Transfer & Vehicles' Air Conditioning	4	2	-	6	30	30	-	90	3										150
EC 2212	Electronic Engineering	2	2	-	4	30	-	-	70	3										100
MP 2213	Fluid Mechanics(1)	4	-	2	6	30	30	-	90	3										150
AT 2214	Vehicle & Tractor Technology (1)	2	-	4	6	30	30	-	90	3										150
MD 2215	Stress Analysis	4	2	-	6	60	-	-	90	3										150
HM 2216	Technical Reports	2	-	-	2	15	-	-	35	2										50
<b>Second Term</b>																				
MD 2221	Machine Elements Design										2	2	-	4	40	-	-	60	3	100
AT 2222	Vehicle Engines (1)										2	2	2	6	30	-	30	90	3	150
MD 2223	Eng. Measurements										2	-	2	4	20	-	20	60	3	100
HM 2224	Eng. Economics & Management										2	2	-	4	30	-	-	70	2	100
MD 2225	Machines Theory & Mech. Vibrations										4	2	-	6	50	-	-	100	3	150
AT 2226	Vehicle & Tractor Technology (2)										2	-	4	6	30	30	-	90	3	150
		18	6	6	30						14	8	8	30						
																	Total Sum of Grades		1500	

Table No. 9

Third Year

Department of Automotive &amp; Locomotive Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
EC 2311	Automatic Control	2	1	1	4	20	20	-	60	3										100
AT 2312	Electrical & Measurement Vehicle Equipment	2	-	4	6	30	-	30	90	3										150
CV 2313	Roadway & Traffic Eng.	2	2	-	4	30	-	-	70	3										100
AT 2314	Vehicle Fuel Systems	2	-	4	6	30	30	-	90	3										150
*2315xE	Elective (1)	2	2	-	4	30	-	-	70	3										100
AT 2316	Vehicles' Engineering (A)	2	2	2	6	30	30	-	90	3										150
<b>Second Term</b>																				
AT 2321	Vehicles' Design(1)										2	4	-	6	60	-	-	90	4	150
AT 2322	Traction & Soil Mechanics										2	2	-	4	20	-	20	60	3	100
HM 2323	Industrial & Environmental Legislations										2	2	-	4	30	-	-	70	3	100
AT 2324	Tractors Eng.										2	4	-	6	50	-	-	100	3	150
*2325xE	Elective (2)										4	2	-	6	30	-	30	90	3	150
AT 2326	Vehicles' Engineering (B)										2	-	2	4	20	-	20	60	3	100
		12	7	11	30						14	14	2	30						
																<b>Total Sum of Grades</b>		<b>1500</b>		

**Notes :**

1. The symbol (x) indicates the code no. of the elective course
2. Courses divided into parts (A) & (B) are considered as **One** continuous course
3. The symbol (\*) indicates the scientific department to which belongs the elective course : PM: Mech. Power Eng.; AT: Autom. & Loc. Eng.; MD: Mech. Design Eng.

Table No. 10

Forth Year

Department of Automotive & Locomotive Eng.

Code Symbol	The Course	First Term									Second Term									Course Grade	
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration		
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written			
<b>First Term</b>																					
AT 2411	Vehicle Design (2)	2	4	-	6	50	-	-	100	4										150	
AT 2412	Vehicle Repair Eng.	2	-	4	6	40	-	20	90	3										150	
AT 2413	Vehicle Transportation Economics	2	2	-	4	30	-	-	70	3										100	
AT 2414	Vehicle & Environment Pollution	2	2	-	4	30	-	-	70	3										100	
*2415xE	Elective (3)	2	2	-	4	30	-	-	70	3										100	
HM 2416	Profession Relationships	2	-	-	2	10	-	-	40	2										50	
AT 2437	Graduation Project	2	-	2	4	50	-	-	-	-	2	-	2	4	50	-	100	-	Discussion	200	
<b>Second Term</b>																					
AT 2421	Vehicles' Dynamics										2	4	-	6	60	-	-	90	3	150	
AT 2422	Vehicles' Maintenance Eng.										2	2	2	6	40	-	20	90	3	150	
AT 2423	Vehicle Automatic Control										2	2	-	4	30	-	-	70	3	100	
HM 2424	Applied Environmental Sciences										2	2	2	6	30	-	30	90	2	150	
*2426xE	Elective (4)										2	2		4	30	-	-	70	3	100	
		14	10	6	30							12	12	6	30						
																	Total Sum of Grades		<b>1500</b>		

- Notes :**
1. The symbol (x) indicates the code no. of the elective course
  2. The symbol (\*) indicates the scientific department to which belongs the elective course : MP: Mech. Power Eng.; AT: Autom. & Loc. Eng.; MD: Mech. Design Eng.

Table No. 11

First Year

Department of Architectural Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
AR 3131	Architectural Design (1)	2	4	-	6	90	-	-	-	-	2	4	-	6	90	-	-	120	8	300
AR 3132	Sciagraphy & Perspective	2	3	-	5	60	-	-	-	-	2	3	-	5	90	-	-	100	6	250
AR 3133	Architectural Construction (1)	2	3	-	5	60	-	-	-	-	2	3	-	5	90	-	-	100	4	250
AR 3114	Design Principles	2	2	-	4	40	-	-	60	3										100
AR 3115	Computer in Architecture	2	2	-	6	30	30	-	90	3										150
CV 3116	Structure Analysis	2	2	-	4	30	-	-	70	4										100
	Practical Training	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	50
<b>Second Term</b>																				
HM 3121	History of Architecture(1)										2	2	-	4	40	-	-	60	3	100
CV 3122	Plane Surveying										2	1	1	4	20	20	-	60	3	100
CV 3123	Properties of Building Materials										2	1	1	4	20	20	-	60	3	100
		12	16	2	30									12	14	2	30			
																	<b>Total Sum of Grades</b>		<b>1500</b>	

- Notes :**
1. Students of the preparatory year are required to carry out – within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year
  2. For the students to pass in courses AR 3131, AR 3132 and AR 3133, he should get 40% at least of the maximum grade of the written exam as well as a 50% of the total sum of grades of the course

Table No. 12 Second Year Department of Architectural Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
AR 3231	Architectural Design (2)	2	4	-	6	90	-	-	-	-	2	4	-	6	90	-	-	120	8	300
AR 3212	Architectural Construction (2)	2	4	-	6	90	-	-	60	4										150
HM 3213	Human Sciences in Architecture	2	2	-	4	40	-	-	60	3										100
AR 3214	Theories of Architecture(1)	2	2	-	4	40	-	-	60	3										100
CV 3215	Technical & Sanitary Fixtures	2	4	-	6	60	-	-	90	3										150
CV 3216	Soil Mechanics & Foundations	2	2	-	4	30	-	-	70	3										100
<b>Second Term</b>																				
AR 3221	Architectural Technology										2	2	-	4	40	-	-	60	3	100
HM 3222	History & Theories of Planning										2	4	-	6	60	-	-	90	3	150
HM 3223	History of Architecture (2)										2	2	-	4	40	-	-	60	3	100
AR 3224	Environmental Control										2	2	-	4	40	-	-	60	3	100
AR 3225	Computer Applications in Architecture										2	2	2	6	30	30	-	90	3	150
		12	18	-	30						12	16	2	30						
Total Sum of Grades																			<b>1500</b>	

**Notes :** For the students to pass in courses AR 3231 & AR3212 he/she should get 40% at least of the maximum grade of the written exam as well as a 50% of the total sum of grades of the course

Table No. 13

Third Year

Department of Architectural Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Weak				Grades' Distribution				Exam Duration	hours per Weak				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
AR 3331	Architectural Design (3)	2	4	-	6	90	-	-	-	-	2	4	-	6	90	-	-	120	8	300
AR 3332	Working Design (1)	2	4	-	6	90	-	-	-	-	2	4	-	6	90	-	-	120	8	300
AR 3313	City Planning	2	4	-	6	60	-	-	90	3										150
HM 3314	History of Architecture (3)	2	2	-	4	40	-	-	60	3										100
CV 3315	Reinforced Concrete	2	2	-	4	30	-	-	70	3										100
AR3316xE	Elective (1)	2	2	-	4	40	-	-	60	3										100
<b>Second Term</b>																				
AR 3321	Housing										2	4	-	6	60	-	-	90	3	150
AR 3322	Theories of Architecture (2)										2	2	-	4	40	-	-	60	3	100
CV 3323	Steel & Wood Constructions										2	2	-	4	30	-	-	70	3	100
AR3324xE	Elective (2)										2	2	-	4	40	-	-	60	3	100
		12	18	-	30						12	18	-	30						
<b>Total Sum of Grades</b>																		<b>1500</b>		

- Notes :**
1. For the students to pass in courses AR 3331 and AR 3332, he/she should get 40% at least of the maximum grade of the written exam as well as a 50% of the total sum of grades of the course
  2. The symbol (x) indicates the code no. of the elective course

Table No. 14

Forth Year

Department of Architectural Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade	
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration		
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written			
<b>First Term</b>																					
AR 3411	Architectural Design (4)	2	4	-	6	90	-	-	60	8											150
AR 3412	Working Design (2)	2	4	-	6	90	-	-	60	8											150
AR 3413	Urban & Regional Planning	2	4	-	6	60	-	-	90	4											150
AR 3414	Planning & Design of Natural Sites	2	-	-	2	10	-	-	40	2											50
AR 3415	Environmental Design & Energy	2	2	-	4	40	-	-	60	3											100
AR3416xE	Elective (3)	2	2	-	4	40	-	-	60	3											100
AR 3437	Graduation Project*	2	-	-	2	50	-	-	-	-	2	8	-	10	100	-	150	-	Discussion	300	
<b>Second Term</b>																					
HM 3421	Construction Economics & Specifications & Quantities										2	4	-	6	60	-	-	90	4	150	
AR 3422	Urban Design										2	4	-	6	60	-	-	90	3	150	
AR3423xE	Elective (4)										2	2	-	4	40	-	-	60	3	100	
AR3424xE	Elective (5)										2	2	-	4	40	-	-	60	3	100	
		14	16	-	30						10	20	-	30							
																	<b>Total Sum of Grades</b>		<b>1500</b>		

- Notes :**
1. For the students to pass in courses AR 3411 and AR 3412, he/she should get 40% at least of the maximum grade of the written exam as well as a 50% of the total sum of grades of the course
  2. The symbol (x) indicates the code no. of the elective course
  3. \* : External examiners, internal examiners as well as the supervising group; should contribute in the grades of the project discussion



Table No. 15 First Year Department of Civil Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
BS 4111	Mathematics (2)	2	2	-	4	30	-	-	70	3										100
BS 4112	Mechanics (2)	2	2	-	4	30	-	-	70	3										100
CV 4113	Structural Analysis (1)(A)	2	3	-	5	50	-	-	75	3										125
CV 4114	Properties & Strength of Materials (1)	4	2	2	8	40	40	-	120	3										200
HM 4115	Technical English Language (2)	2	-	-	2	10	-	-	40	2										50
CV 4116	Eng. Geology & Environmental Eng.	4	3	-	7	60	-	-	115	3										175
	Practical Training**	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	50
<b>Second Term</b>																				
BS 4121	Physics (2)										2	2	1	5	25	25	-	75	3	125
CV 4122	Plane Surveying										4	1	1	6	40	20	-	90	3	150
CV 4123	Structural Analysis (1)(B)										4	2	-	6	60	-	-	90	3	150
CV 4124	Civil Eng. Drawing										2	3	-	5	50	-	-	75	4	125
EP 4125	Mechanical & Electrical Eng.										2	1	-	3	25	-	-	75	3	75
AR 4126	Architectural Construction										1	2	-	3	25	-	-	50	2	75
		16	12	2	30						15	11	2	30						
																		<b>Total Sum of Grades</b>		<b>1500</b>

**Notes :**

- \*\* :Students of the preparatory year are required to carry out – within a period of 2 weeks - practical training in Engineering Drawing according to a schedule specified by the faculty committee and it's grades are added to the grades of the first term of the first year
- Courses divided into parts (A) & (B) are considered as **One** continuous course

Table No. 16

Second Year

Department of Civil Engineering

Code Symbol	The Course	First Term									Second Term									Course Grade
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration	
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		
<b>First Term</b>																				
CV 4211	Reinforced Concrete (1)	4	4	-	8	80	-	-	120	4										
CV 4212	Structural Analysis (2) (A)	2	2	-	4	40	-	-	60	3										
CV 4213	Properties & Strength of Materials (2)	4	1	1	6	40	20	-	90	3										
CV 4214	Topographic Survey	4	1	1	6	40	20	-	90	3										
CV 4215	Irrigation & Drainage Eng.	2	2	-	4	30	-	-	70	3										
HM 4216	Profession Relationships	2	-	-	2	10	-	-	40	2										
<b>Second Term</b>																				
CV 4221	Structural Analysis (2) (B)										2	2	-	4	40	-	-	60	3	100
CV 4222	Soil Mechanics										4	1	1	6	40	20	-	90	3	150
CV 4223	Photogrametry and Remote Sensing										2	2	2	6	40	20	-	90	3	150
CV 4224	Hydraulics (1)										4	1	1	6	40	20	-	90	3	150
HM 4225	Construction projects' Management										2	2	-	4	30	-	-	70	3	100
BS 4226	Numerical Analysis										2	2	-	4	30	-	-	70	3	100
		18	10	2	30						16	10	4	30						
																	Total Sum of Grades		<b>1500</b>	

Notes : Courses divided into parts (A) & (B) are considered as **One** continuous course

**Table No. 17 Third Year Department of Civil Engineering**

Code Symbol	The Course	First Term									Second Term									Course Grade		
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration			
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written				
<b>First Term</b>																						
CV 4311	Reinforced Concrete (2)	4	4	-	8	80	-	-	120	4												200
CV 4312	Soil Mechanics & Foundations	2	2	-	4	20	20	-	60	3												100
CV 4313	Structural Analysis (3) (A)	4	1	-	5	50	-	-	75	3												125
HM 4314	Eng. Economics	2	1	-	3	25	-	-	50	2												75
CV 4315	Hydraulics (2)	4	1	1	6	40	20	-	90	3												150
CV 4311xE	Elective (1)	2	2	-	4	30	-	-	70	3												100
<b>Second Term</b>																						
CV 4321	Design of Irrigation Structures (1)										4	2	-	6	60	-	-	90	3		150	
CV 4322	Steel Structures (1)										4	2	-	6	60	-	-	90	3		150	
CV 4323	Structural Analysis (3) (B)										2	2	-	4	40	-	-	60	3		100	
CV 4324	Eng. Geodesy										4	1	1	6	40	20	-	90	3		150	
HM 4325xE	Elective (2)										2	2	-	4	30	-	-	70	3		100	
CV 4326	Transportation Planning & Traffic Eng.										2	2	-	4	30	-	-	70	3		100	
		18	11	1	30						18	11	1	30								
																			<b>Total Sum of Grades</b>		<b>1500</b>	

**Notes :**

1. The symbol (x) indicates the code no. of the elective course
2. Courses divided into parts (A) & (B) are considered as **One** continuous course

**Table No. 18 Forth Year Department of Civil Engineering**

Code Symbol	The Course	First Term									Second Term									Course Grade	
		hours per Week				Grades' Distribution				Exam Duration	hours per Week				Grades' Distribution				Exam Duration		
		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written		Lecture	Exercise	Practical work	The Sum	Class Grades	Practical Work	Oral	Written			
<b>First Term</b>																					
CV 4411	Reinforced Concrete (3)	2	2	-	4	50	-	-	-	-	2	2	-	4	30	-	-	120	4	200	
CV 4412	Steel Structures (2)	4	2	-	6	60	-	-	90	3										150	
CV 4413	Foundation Eng.	4	2	-	6	60	-	-	90	3										150	
CV 4414	Design of Irrigation Structures (2)	4	2	-	6	60	-	-	90	3										150	
CV 4415	Highways & Airports Eng.	2	1	1	4	20	20	-	60	3										100	
CV4416xE	Elective (3)	2	1	-	3	25	-	-	50	3										75	
<b>Second Term</b>																					
CV 4421	Harbor & Navigation Eng.										2	2	-	4	30	-	-	70	3	100	
HM 4422	Technical Reports										1	2	-	3	25	-	-	50	2	75	
CV 4423	Sanitary Engineering										2	2	2	6	40	20	-	90	3	150	
CV 4424	Specifications, Quantities & Contracts										2	1	-	3	25	-	-	50	2	75	
CV4425xE	Elective (4)										2	1	-	3	25	-	-	50	2	75	
CV 4426	Graduation Project										4	2	-	6	100	-	100	-	Discussion	200	
		18	11	1	30						15	12	2	29							
																			Total Sum of Grades		<b>1500</b>

**Notes :**

1. The symbol (x) indicates the code no. of the elective course

**BS 0011 Math (1) (A)**

Introduction to functions – inverse function – elementary functions – trigonometric and inverse trigonometric functions – exponential function – logarithmic functions – hyperbolic and inverse hyperbolic functions – limits – continuity – the intermediate value theorem – the extreme value theorem – derivative – applications on derivative – mean value theorem – curve sketching – convexity and concavity – extreme of functions – approximation of functions. Indefinite integrals – methods of integration – definite integrals. the fundamental theorem of calculus – improper integrals – l' Ho pital rule- applications on integration – areas – volumes of solids of revolution – are length and areas of surfaces of revolution – numerical integrator.

**BS 0012 Physics (1) (A)**

Properties of matter, physical quantities, units, properties of mech. and electric materials- gravitational field and its applications- fluid statics- fluid dynamics – viscosity- elasticity- sound waves- waves in elastic media- heat and heat dynamics- heat transfer- molecular motion of gasses- first low of heat dynamics- entropy and the second low of heat dynamics – applications.

**BS 0033 Mechanics (1)\***

Vectors Algebra and Applications – Resultant and Moments of a Force System – Equivalent Force Systems – Equilibrium of Particles – Friction – Hinges and Pulleys - Center of Gravity – Moment of Inertia – Product of Inertia Moment – Inertia Moment Transfer Theories – Mohr's Circle.

Kinematics of Particles – Coordinate Systems – Linear and Curvilinear Motions – Relative Motion – Kinetics of Particles – Newton's Laws of Motion – Constant and Variable Acceleration – Applications – Work and Energy of Particles – Work and Kinetic Energy – Different Types of Energies – Power.

**MD 0034 Engineering Drawing & Projection\***

Drawing technology and skills. Engineering operations - Projection theory: Projection of a point, line, plane simple bodies – Assisted projections. Intersection of planes and surfaces. Unfolding body surfaces. Orthogonal projection. Writing dimensions. Isometric. Principles of sectioning. Steel connections. Principles of architectural drawing.

Orthogonal projection – Representation of a point – Representation of a straight line – position problems – metric problems – auxiliary projection – Rotation – polyhedral development – Representation of a circle – Representation of a sphere.

**BS 0015 Computers and Programming**

Computer system – brief history – Computer devices and element – input and output devices – central processor unit – additional units – software programs – operating system programs – programming languages application – program flowcharts – problems solving and programs – software algorithms – Boolean algebra – principles of spreadsheet and database – application program development.

**BS 0016 Chemistry**

States of matter – solutions – phase rule – chemical equilibrium – electrochemistry – water treatment – building materials – pollution – other chemical industries – mineral fertilizers.

Dyes, color and chemical constitution – polymers – sugar and starch industries – petrol – chemicals – semiconductors – oils, fats, soaps and detergents.

**HM 0017 English Technical Language (1)**

Introduction - characteristics of technical English language – revision of English grammar – some styles of writing – characteristics of effective sentences – common faults in writing of sentences in English language – construction of paragraphs: main idea – methods of presentation of main idea – types of paragraphs – analysis of some technical writings in different engineering specializations – translation.

**BS 0021 Math (1) (B)**

Theory of equations – matrices – matrices and linear system – determinants and linear systems – eigenvalues and eigenvectors – applications on matrices and determinants – sequences and series – vectors – polar, cylindrical and spherical coordinates – equations of the second degree – parabola – ellipse – hyperbola – translation and rotation of axes – equations of pairs of straight lines – equation of sphere and surfaces of revolution – equations of straight lines and planes in space.

**BS 0022 Physics (1) (B)**

Electricity and magnetism- Charge- Matter and electric field- Gauss law- electric Potential- capacitors and insulating materials- current, resistance, and electric Field- magnetic field- Amper law- Savart and biot laws- Faraday's law- magnetic properties of materials- Maxwell's equations- integral form- heat effect of current- optics- properties of optics- electromagnetic waves - optical phenomena - deviation of optics- mirrors - lenses- optical fibers.

**MR 0023 Production Technology**

Introduction to engineering material (ferrous & non-ferrous) – Polymers – ceramic – composite materials: types and characteristics – casting – sand casting – forming – forging – rolling – drawing – fastening & joining – riveting – welding – cutting – hand operations – machine operations – turning – shaping – drilling – milling - grinding – measurement tools – Vernier caliper – micrometer.

**HM 0024 Introduction to Engineering Sciences**

Definitions - history of technology and engineering in its different branches – historical interconnection between science and technology – examples on the development of different engineering activities.

**BS 1111 Mathematics (2)****BS 2111**

Complex Numbers – Functions of complex variables – Cauchy-Reimann equations – Analytic functions – Elementary functions – Conformal mapping – Complex integration – Cauchy theorem – Applications of complex integration – Complex series and Laurent series – Series solution of differential equations – Special functions Fourier Integrals and Fourier Transformation – Partial differential equations.

**BS 1112 Physics (2)****BS 2112**

Waves and vibrations- harmonic vibration in dynamical and electrical systems- geom. representation- interference -damped vibration- Fourier analysis of damped vibration- types of waves- wave velocity- velocity of sound waves in fluids- wave measurements- Doppler effect- electromagnetic waves- optics- optic interference- Newton ring – deviation – new concepts- quantum mech. - electro optical phenomena- laser – applications of sound waves - applications in mech. eng.

**MR 1113 Production Engineering****MR 2123**

Theory of metal cutting – different cutting theories – cutting temperature and methods of temperature measuring – tool life & tool wear and factors affecting tool life – measurement of tool life – surface roughness – measurement of machined surface – economics of metal cutting – machine tools – turning – drilling – milling – saws – shaping – gear box – gear box design – sliding gears – rolling & drawing operations – introduction to the use of computers in manufacturing workshops – CAD/CAM – components of NC machine tools – types of NC machines – steps for NC machining.

**MD 1114 Mechanical Drawing**

Types of drawings: Sketching, Structural drawing, Assembly drawing, Working drawing. Surface finish symbols. Fits and tolerances. Standard tables. Material codes. Threads (types, specs). Joints. Bolts and Nuts. Springs (types, specs). Keys. Rivets. Welds. Gears. Introduction to CAD.

**BS 1115 Mechanics and Strength of Materials**

Kinematics of rigid bodies –translation and rotation- motion on curves- rotation without sliding- motion on a plan- center of mass- moment of inertia -free and forced vibrations – work, energy and law of conservation- impulsive motion. Stresses and Strains. Testing machines and strain gages. Engineering material behavior under tension, compression and cold bending. Direct and transverse shear. Torsion. Fatigue. Hardness. Toughness and impact stresses. Experimental part: Mechanical tests. Static tests: Tension, compression, shear, bending, torsion, hardness. Dynamic tests: Fatigue, impact.

**EP 1116 Electric Engineering****EP 2117**

Electric field – Magnetic field – Electric circuits – Elements of electric circuits – Sources of electric voltage – Electric current sources – Elements of resistances – Capacitors and induction coils – Methods of analysis for continuous current circuits – Node analysis – Method of superposition – Circuits theories – Sine concept – Applications on theory of oscillating current electric circuits

**MP 1121 Fluid Mechanics (1)**

Introduction – Fluid Principles Definitions – Fluid statics – Fundamentals of fluid motion – Fluid kinematics – Principal equations for mass continuity; energy conservation; momentum in integral formula – Applications – Dimensional analysis and similarity – Laminar & turbulent flow – Laminar flow cases – Steady flow in pipelines – Friction coefficient and losses – Minor losses – Methods of nets connection.

**MP 1122 Thermodynamics (1)****MP 2121**

Basic fundamentals and definitions – Energy concepts – First law of thermodynamics – closed systems – energy equation for closed systems – Continuity equations – Energy equation for open systems – Steady and unsteady flow through open systems – Properties of pure substance – Ideal gas model – Reversible processes – Irreversible processes – Second law of thermodynamics – Carnot cycle – Heat engines and efficiency – Entropy – Entropy change – Properties of gas and vapour mixture – Enthalpy and internal energy of gas and vapour mixture.

**BS 1123 Computer Applications & Programming**

Introduction – Computer language and programming – Data base – Using programs to find approximate solutions for equations – Solution of algebra linear non-linear equations – Numerical integration – Solution of differential equations – Engineering applications – Use of ready prepared programs.

**MD 1124 Stress Analysis**

Equilibrium of simple mechanical elements. Normal and shear forces. Bending and torsional moments. Stresses in loaded elastic bars: Axial, bending, torsion. Strains. Rigidity. Strain energy. Stresses in combined loading: Eccentric loads, inclined bending and torsion. Two dimensional stresses: Principal stresses, Mohr circle, theory of failure. Applications: Thin and thick cylinders, springs, Frames, Finite elements.

Experimental part: Strain measurements, Wightstone Bridge, principal strains, strains in thin and thick cylinders, stress concentration factor, elastic failure, and deflections of beams.

**MD 1125 Science and Engineering of Materials**

Metallic and non-metallic materials. Crystals - Mechanical properties - Relation between crystals and properties - Material codes and standards - Alloying theory - Heat treatments. Polymers - Composites. Ceramics - Material selection. Non-destructive tests.



**HM 1126 Technical English Language (2)**

Exercises related to scientific topics – Development of student's knowledge in language and ability for reading and understanding – Developing of understanding and translation abilities of the student – Developing of listening and speech abilities of the student – exercises on writing technical topics – readings in scientific books – methods of search – technical writing.

**BS 1211 Numerical Analysis**

Numerical solution of linear systems- numerical solution of nonlinear equations- interpolation-numerical integration and differentiation-curve fitting-optimization-numerical solution of ordinary and partial differential equations. Probability and statistics-discrete and continuous random variables-frequency tables-deviation measures- data analysis- optimization techniques.

**MP 1212 Thermodynamics (2)**

Availability – Gas power cycles – Gas turbines – Vapour power cycles – Reversed cycles – Reversibility – Combined cycles to generate electric energy – Relation between thermodynamics properties and effect of real gases – Introduction to the principles of stoichiometry and applications – Combustion reaction for mixtures and applications of first and second laws of thermodynamics – principles of chemical and phase balance.

**MD 1213 Theory of Machines**

Complete mechanism analysis – kinematics of mechanism using graphical and vectors method - Analysis of static and dynamic forces on the mechanism – Determination of vibrating forces at bearings – Design of cams and follower – Kinematics analysis for cam and follower by analytical methods – Classification of gears and their effect on design factors – Determination of gear speed – Analysis of stress curve of bearing for engines and design of wheels.

**MP 1214 Fluid Mechanics (2)**

Differential form of continuity motion – approximate and analytical solutions – Flow through boundary layer – Potential flow theory – Flow around immersed bodies – Unsteady flow – Introduction to flow control – Introduction to computational fluid mechanics.

**EC 1215 Electronic Engineering**

Introduction – Review of power connection – Dual linkage – electronic circuits – Amplifiers – Counters – Stabilizers – Output signals – Transistors – Logical circuits – Digital to analog and analog to digital circuit – Signal summing system – Circuit applications for angular speed - - Stepping motor – Ignition and electronic injection in the internal combustion engine – Other applications – Introduction to robots.

**HM 1216 Technical Report Writing**

Introduction – writing of numbers; symbols; abbreviations and equations – Rules of statement writing; language; structure; accuracy; consolidation; variety; confirmation – variation of sentences – Easiness to read – Basic writing of active paragraph – How to start writing – summary and conclusion – writing and

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organizing the subject – Review and editing – Different forms of writing: letters; notes; proposals; reports; examples; references; tables and tables – Final edition of technical writing.

**MD 1221 Machine Elements Design**

Introduction to design and creativity - Mechanical properties of materials and manufacturing -Design considerations and factor of safety -Dynamic stresses and product life - Power transmission and shafts: Coupling, belts, power screws, spring.

**MP 1222 Electric Machines**

Types of electric machines – Direct current machine – Multi-phase alternative current system – electric transformers – Induction machine – Synchronizing machine – Small power engines – Electric distribution systems – Cables and their properties – Electric machine safety – Electric transformers safety – Laboratory tests.

**MP 1223 Heat Transfer**

Introduction to heat transfer – One-dimensional heat transfer – Heat transfer with heat generation elements – Continuous heat transfer in two dimensions – Unsteady one directional heat transfer – Convection heat transfer – Free convection relations – Forced convection relations – Mixed convection heat transfer – Fins and extended surface – Heat transfer with phase change.

**MP 1224 Engineering Measurements**

Operating performance of measurement device – Measurement system element – Fixed and variable errors – Measuring error treatment – Digital measuring technique – Force measurement – Torque measurement – Pressure measurement: manometers – Dynamic device for pressure measurements – Electric device for pressure measurements – Flow measurement device: orifice; nozzle; ventury; rotating turbine and rotameter – Velocity measurement: pitot tube - Hot wire - Laser – Angular velocity measurement – Temperature measurement: Thermometer; bimetal sensor – Variable resistances – Semiconductors – Thermocouples – Radiometer – Measurement of gas exhaust components – Sensors – Analysis of exhaust gas.

**MP 1225 Control of Mechanical Power Systems**

Introduction to automatic control – Assessment of automatic control systems – Classification of automatic control systems – Basic elements in automatic control systems – Signal conditioning – Kinds of automatic control systems – Applications of mechanical power automatic systems.

**HM 1226 Industrial and Engineering Legislations**

Industrial rules – Characteristics of industries – Industrial safety rules – Labour rules – Insurance rules – Environmental rules – Financial arrangements – Tax laws – Different degrees of prosecution – Capital and small projects and their rules – Needs, regulations and rules of engineering projects.

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**MP 1311 Heat and Mass Transfer**

Kinds of heat exchangers – Performance of heat exchanger – Heat radiation – Heat radiation between gases and fires – Radiation and environment – Mass transfer in solids; liquid ; gases – Application of mass transfer – Ways of heat transfer improvement.

**MP 1312 Fundamentals and Technology of Combustion**

Hydrocarbon fuels – Combustion chemistry – Combustion aerodynamics – Fuel preparation for combustion – Kinds of burners – Design of burners – Burner performance – Combustion control – Combustion application in furnaces – Boilers and turbines – Combustion pollutions – Control systems in combustion pollutants – Laboratory tests.

**MP 1313 Refrigeration and Air Conditioning**

Refrigeration methods – Vapour compression refrigeration systems - Refrigerants – Absorption refrigeration systems – Air refrigeration systems – Introduction to psychometric chart – Air conditioning systems (summer; winter; annual) – Refrigeration and heat loading – Air conditioning equipments by air ducts – Air duct design.

**MD 1314 Mechanical Vibrations**

Principles of vibrational motion - Elements of vibration system - Single degree of freedom - Effect of damping on free vibrations - Forced vibrations and applications - Shaft stability – Isolation - Measurement devices - Two degree of freedom systems – Dampers - Multi degree of freedom systems and solution methods - Computer applications.

**MP 1315 Hydraulic and pneumatic Control**

Hydraulic control: hydraulic fluids ; Control elements – Working elements – Experimental applications.

Pneumatic control: Compressed air; Control elements – Working elements – Experimental applications. Design of control circuits: electronic; electric; electro-pneumatic.

**MP 1321 Internal Combustion Engines (1)**

Introduction – Idea of internal combustion engine – Fuel and air cycles – Actual cycle of engine – Performance factors in internal combustion engine – Properties of fuels – Combustion in internal combustion engine – Combustion chamber in internal combustion engine – Combustion in diesel engine – Lubrication and friction – Engine indicator.

**MD 1322 Machines' Design**

Selection and design of rolling element bearings - Lifetime, wear, lubrication - Hydrostatic and hydrodynamic bearings - Gears: Straight, helical, bevel and worm types - Gear boxes - Design of belt systems - Design of thermal systems, heat exchangers, pressure vessels, economizers, and super heaters, cooling towers.

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**MP 1323 Mechanical Power Laboratories (1)**

Calibration of pressure measuring devices – Experiments in refrigeration and air conditioning – Fluid flow through openings with different shapes – Discharge coefficient measurement – Satisfying of Bernoulli's equation – Laminar and turbulent flow – Impact of jet – Visualization of fluid flow – Friction factor in pipe lines – Pelton wheel – Experiments on internal combustion engines.

**MP 1324 Gas Dynamics**

Compressible flow – Properties of flow in variable area ducts – Introduction to shock wave – Normal and oblique shock wave – Flow in pipes of constant area with and without friction – Flow over surfaces – Compressible flow in two dimensions.

**HM 1325 Environmental Sciences**

Definition of environment – Definition of earth: atmosphere; air ; climate – Natural cycles of substances (carbon; hydrogen; phosphorus; ...) – Pollution definitions: air pollution; water pollution; earth pollution – Kinds of pollutants: solid; dangerous; toxic – Environment and toxic pollutants – Kinds of chemical toxics and their effects on human life ( digestive system; respiratory system; ....) – Toxic measurements – Technology of toxic decay and degree of danger – Toxic cycles in the earth – Environment and the society – Study of habits and their effect on environment pollution – View of industry pollution.

**MP 1411 Internal Combustion Engines (2)**

Gases reciprocate in internal combustion engines (2 stroke – 4stroke) – Cooling and thermal loading in engines – Charging – Electric spark ignition systems – Calibration and fuel injection – Air pollutants from engines – New trends in engines design and development – Performance calculations.

**MP 1412 Thermal Turbo Machinery**

Basic thermodynamics and fluid mechanics for turbines – Different classifications of turbo machinery – Euler's equation - Losses – Efficiencies – Non-dimensional terms – one dimensional flow – Two dimensional flow through guide vans – Axial, radial and mixed turbines – Axial, radial and mixed compressors and pumps – Effect of viscosity, compressibility, vapor pressure and wall layer on the performance - Performance curves – Effect of three dimensional flow.

**MP1413 Mechanical Power Laboratories (2)**

Experiments on internal combustion engine: Spark ignition engine; Diesel engine – Continuous combustion experiments: gas fuel combustion; cook combustion; combustion of liquid fuel – Experiments of refrigeration – Experiments of hydraulic machines.

**MP 1436 B.Sc. Graduation Project**

The student introduces a complete study and constructs a project determined through his department applying the basics of sciences that he studied – The student presents a report containing the rules and calculations that he made in his project.

**HM 1417 Applied Environmental Sciences**

Definition of industrial pollutants and their sources – Combustion pollutants produced from combustion devices (industrial furnaces; boilers; gas turbines) – Kinds of internal combustion engines (gas; spark ignition; diesel) – Industrial pollution from different industries – Technology of pollution treatment.

**MP 1421 Power Plants and Their Economics**

Classification of power station – Analysis of load, storage and economy in power stations: daily load – annual load – coefficients of performance. Turbines selection – Steam power stations: Cycles and components – evaporators – reheat and super heaters – savers – air heaters – condensers. Pumps, connections and pipe lines – Boilers : methods of running it – coefficient of its performance and heat balance – control devices – new trends for steam generation – power generation and its effects on environment.

**MP 1422 Hydraulic machines and Their Plants**

Introduction – Basic relations – Euler's equation – Efficiencies and losses – Dimensional analysis and similarity – Effect of relative measurement - Specific speed – Cavitation – Water turbines: turbine efficiency and losses – Thoma's cavitation factor – turbine positioning – water turbine technology – water power stations – turbine classification - components impulse turbine (Pelton – Togo – Michel) – theory – design - performance. Reaction turbines: radial and mixed (Francis) - axial (Kaplan) – theory – design – performance – comparison between performance curves for different turbines. Design of rotor, stator and duct – Power station economy – Centrifugal pumps: classifications (radial – mixed – axial) – pumps arrangements – Euler's equation – effect of exit angle – effect of vane number (slipping – vane thickness) losses – pumps performance – similarity laws – pump selection – cavitation – Thoma's factor – net positive suction head (available and required) – system and working point curve - pumps in series and parallel connection – pump control – preparation – casing design – sealing – sealing box – discovering of problems – transient head in the system – hydraulic comparative and torque transformers: relations and characteristics curve.

**Mp 1423 Thermal Equipments**

Essential equipments: design of thermal equipments used in industrial issues (heat exchangers – boilers – condensers - evaporators – cooling towers) and its applications – setting, running, maintenance and troubleshooting of heat exchangers – systems of air and gas drawing from thermal system – Valves: its kinds and usage – Pipes: its kinds – methods of its setting – its usage. Gas and liquid tanks: its kinds and usage – Application examples.

**HM 1426 Engineering Economics and Management**

Engineering economics: Cost - Cost / benefit analysis – Capital circulation – Consumption – Optimum use of material – Taxes – Technical Feasibility studies – Performance evaluation. Management: Management definition – Management levels – Planning – Control – Control management.

**BS 2111 (same as BS1111)**

**BS2112 (same as BS1112)**

**CV 2113 Structural Analysis**

Introduction to theory of structures – Forces – Types of loads – Moments – Reactions – Equilibrium of statically determinate structures – Stable and unstable structures – Methods of determination – Structural analysis – Shearing forces – Moments – Buckling – Internal stresses – Deformation – Analysis of trusses.

**MD 2134 Mechanical Drawing**

Types of drawings: Sketching, Structural drawing, Assembly drawing, Working drawing. Surface finish symbols. Fits and tolerances. Standard tables. Material codes. Threads (types, specs). Joints. Bolts and Nuts. Springs (types, specs). Keys. Rivets. Welds. Gears. Introduction to CAD.

**BS 2115 Mechanics (2)**

Kinematics of rigid bodies –translation and rotation- motion on curves- rotation without sliding- motion on a plan- center of mass- moment of inertia -free and forced vibrations – work, energy and law of conservation- impulsive motion.

**MD 2116 Testing and Strength of Materials**

Stresses and Strains. Testing machines and strain gages. Engineering material behavior under tension, compression and cold bending. Direct and transverse shear. Torsion. Fatigue. Hardness. Toughness and impact stresses.

Experimental part: Mechanical tests. Static tests: Tension, compression, shear, bending, torsion, hardness. Dynamic tests: Fatigue, impact.

**EC 2117 (same as EC 1116)**

**EC 2121 (same as EC 1122)**

**BS 2122 Computer Applications & Programming**

Introduction – Computer language and programming – Data base – Using programs to find approximate solutions for equations – Solution of algebra linear non-linear equations – Numerical integration – Solution of differential equations – Engineering applications – Use of ready prepared programs.

**MR 2123 (same as 1113)**

**MD 2124 Science and Engineering of Materials**

Metallic and non-metallic materials. Crystals - Mechanical properties - Relation between - crystals and properties - Material codes and standards - Alloying theory - Heat treatments - Polymers. Composites - Ceramics. Material selection - Non-destructive tests.

**HM 2125 Technical English Language (2)**

Exercises related to scientific topics – Development of student's knowledge in language and ability for reading and understanding – Developing of understanding and translation abilities of the student – Developing of listening

and speech abilities of the student – exercises on writing technical topics – readings in scientific books – methods of search – technical writing.

### **MP 2211 Heat Transfer and Vehicle Airconditioning**

Physical principles of air conditioning – assembling and performance of vehicles cooling systems – air-flow and air temperature control in vehicles- systems of cooling diagnoses – maintenance of cooling systems parts – services and maintenance of cooling systems.

### **EC 2212 Electronic Engineering**

Introduction – Review of power connection – Dual linkage – electronic circuits – Amplifiers – Counters – Stabilizers – Output signals – Transistors – Logical circuits – Digital to analog and analog to digital circuit – Signal summing system – Circuit applications for angular speed - - Stepping motor – Ignition and electronic injection in the internal combustion engine – Other applications – Introduction to robots.

### **MP 2213 Fluid Mechanics (1)**

Introduction – Fluid Principles Definitions – Fluid statics – Fundamentals of fluid motion – Fluid kinematics – Principal equations for mass continuity; energy conservation; momentum in integral formula – Applications – Dimensional analysis and similarity – Laminar & turbulent flow – Laminar flow cases – Steady flow in pipelines – Friction coefficient and losses – Minor losses – Methods of nets connection.

### **AT 2214 Vehicle and Tractor Technology (1)**

Engine essential systems - engine lubricating systems – carburetor fuel system – diesel fuel system – engine cooling system – engine ignition system.

### **MD 2215 Stress Analysis**

Equilibrium of simple mechanical elements. Normal and shear forces. Bending and torsional moments. Stresses in loaded elastic bars: Axial, bending, torsion. Strains. Rigidity. Strain energy. Stresses in combined loading: Eccentric loads, inclined bending and torsion. Two dimensional stresses: Principal stresses, Mohr circle, theory of failure. Applications: Thin and thick cylinders, springs, Frames, Finite elements. Experimental part: Strain measurements, Wightstone Bridge, principal strains, strains in thin and thick cylinders, stress concentration factor, elastic failure, and deflections of beams.

### **HM 2216 Technical Report Writing**

Introduction – writing of numbers; symbols; abbreviations and equations – Rules of statement writing; language; structure; accuracy; consolidation; variety; confirmation – variation of sentences – Easiness to read – Basic writing of active paragraph – How to start writing – summary and conclusion – writing and organizing the subject – Review and editing – Different forms of writing: letters; notes; proposals; reports; examples; references; tables and tables – Final edition of technical writing.

**MD 2221 Machine Elements Design**

Introduction to design and creativity - Mechanical properties of materials and manufacturing -Design considerations and factor of safety -Dynamic stresses and product life - Power transmission and shafts: Coupling, belts, power screws, spring.

**AT 2222 Vehicle Engines (1)**

Thermodynamic cycles of internal combustion engines – fuel and air systems – actual engine cycle – fundamental performance factors for internal combustion engine – gases exchanges in two stroke and four stroke engines – cooling and thermal load for engines – friction and lubrication in engine – mixers and injection pumps – performance – ignition systems – engine pollution and their control – performance at full and partial loads – fuel characteristic and their effect on performance – power and efficiency and pollution emission – necessary tests: increasing power – charge and charge methods – relation between engine and charger – conventional and electronics ignition systems – governors – performance map – modern ways in internal combustion engines design.

**MP 2223 Engineering Measurements**

Operating performance of measurement device – Measurement system element – Fixed and variable errors – Measuring error treatment – Digital measuring technique – Force measurement – Torque measurement – Pressure measurement: manometers – Dynamic device for pressure measurements – Electric device for pressure measurements – Flow measurement device: orifice; nozzle; ventury; rotating turbine and rotameter – Velocity measurement: pitot tube - Hot wire - Laser – Angular velocity measurement – Temperature measurement: Thermometer; bimetal sensor – Variable resistances – Semiconductors – Thermocouples – Radiometer – Measurement of gas exhaust components – Sensors – Analysis of exhaust gas.

**HM 2224 Engineering Economics and Management**

Engineering economics: Cost - Cost / benefit analysis – Capital circulation – Consumption – Optimum use of material – Taxes – Technical Feasibility studies – Performance evaluation. Management: Management definition – Management levels – Planning – Control – Control management.

**MD 2225 Engine Design and Mechanical Vibrations**

Engine types. Modern designs. Selection of engines. Crank shaft dynamics. Design of cylinders, cylinder head, piston, connected rod, crankshaft and flywheel. Torsional vibrations. Critical speed. Torsional dampers. Project. Principles of vibrational motion - Elements of vibration system - Single degree of freedom - Effect of damping on free vibrations - Forced vibrations and applications - Shaft stability – Isolation - Measurement devices - Two degree of freedom systems – Dampers - Multi degree of freedom systems and solution methods - Computer applications.



**AT 2226 Vehicle and Tractor Technology (2)**

Power train line – suspension system – steering system – breaking system – axles and wheels – structural and vehicle chases.

**EP 2311 Automatic Control**

Automatic systems – system modeling of dynamic systems – industrial control units and their different utilization – systems stability analysis by different methods – systems stability analysis by root locus – systems frequency analysis – different methods of compensatory design – control system analysis using three dimensions.

**AT 2312 Vehicle Electrical and Measurement Equipment**

Batteries – AC generators and regulators- chargers – DC generators and Starters – conventional and electronic ignition systems – computer commands for control systems – chassis electricity and electric systems – trailer eclectic systems and their connections with vehicles.

**CV 2313 Roads and Traffic Engineering**

Introduction-Engineering planning of roads-Impact of vehicle specifications on planning-Impact of roads on environment:Air pollution; visual pollution-Design of accidents' resistors-Structural design of roads:different design methods-Methods of loads and reaction analysis.

**AT 2314 Vehicle Fuel Systems**

Mixture formation requirements of spark ignition engine – the carburetor basics – design of modern carburetors – petrol Injection Systems – compression Injection Systems.

**AT 2316 Vehicle Engineering (A)**

Automobile force resistance – equation of vehicle motion – characteristics of vehicle performance – engine performance – characteristics of breaking performance of tow axle vehicle- dynamic of vehicle braking: braking distance – braking time braking efficiency – distribution of braking forces on vehicle axles: tow axles: tow axle vehicle – multi axle vehicle – semi-trailer vehicle.

**AT 2321 Vehicle Design (1)**

Clutches: purpose – types – dry friction clutches – single disc clutch and multi-disc clutch – friction materials – coil and disc spring – clutch release mechanism – wet clutch – centrifugal clutch – friction effort and clutch – temperature – hydraulic clutch and torque converter – gear boxes- requirements of the gear boxes – vehicle motion resistance – different types of the gear boxes that applied in passenger cars and trucks – auxiliary gear boxes – planetary gear boxes – automatic gear box and torque converter – design of gears and axles – bearings testing – lubrication of gears and bearings – traction axles and joints – hollow and solid traction axles – joints of traction axles – solid an hollow propeller shafts – propeller shaft joints – joints of constant speed –oo differential gears design.

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**CV 2322 Traction and Soil Mechanics**

Theory of traction: soil classification – soil deformation – types of stress on soil – soil failure due to motion of wheeled and tracked vehicles – shear stress on soil, pressure distribution in the soil – traction-slip relationship – rolling resistance – soil compaction – performance criteria – tires efficiency – detachable traction aids for two and four wheel drive vehicles – traction performance prediction – energy dissipation in traction – off-road vehicles steering: slipping and sliding of steered wheel – steering of tracked vehicles – traction and stability control.

**HM 2323 Industrial and Engineering Legislations**

Industrial rules – Characteristics of industries – Industrial safety rules – Labour rules – Insurance rules – Environmental rules – Financial arrangements – Tax laws – Different degrees of prosecution – Capital and small projects and their rules – Needs, regulations and rules of engineering projects.

**AT 2324 Tractors Engineering**

Tractors engines characteristics and traction torque – Tractor wheel kinematics and dynamics – Wheeled tractor dynamics – Equation of motion for wheeled tractor – Longitudinal stability of tractors with towed machines – Tractor stability with built-in machines – Tractor track kinematics and dynamics – External forces acting on tracked tractors – Identification of the center of ground pressure between earth and running gear – Longitudinal stability of tractors with towed and built-in machines – Pressure distribution between track and the ground – Lateral stability of wheeled and tracked tractors – Measures of lateral stability – Equation of motion for tracked tractor – Gear ratios in tractor drive line – Steering of tracked tractors- turning resistance – turning torque – steering mechanisms of tracked tractor – clutches and brakes mechanisms – controlled differential – planetary – articulated.

**AT 2326 Vehicle Engineering (B)**

Characteristics of braking performance when using control system – vehicle stability on curvature roads – vehicle stability on inclined roads: longitudinal – lateral. Stability in braking.

**AT 2411 Vehicle Design (2)**

Design of vehicle frame – braking condition steering condition – combined braking and steering conditions – design of suspension systems – flexible components – dampers – guides – design of the steering system – basic analysis and design – design of the steering boxes – design of the hydraulic cylinders that used in the steering systems – initial spring load and piston diameter – design of the braking system – force distribution on the brake shoe – torque of the brake shoes – basic items of the brake system design considering cylinders or drums – basic design items of disc brakes – design of the hydraulic cylinders that used in the braking systems – axles : types – driving axles – steering axle – steering and drive axle – driven axle final reduction drive – single double and triple – different design for final drive axle – force and push rods.

**AT 2412 Vehicle Repair Engineering**

Engine repair – cylinder head – cylinder – piston and its rings – crankshaft – journal bearings – clutch repair – gearbox repair – front and rear axles repair – brakes repair – steering and suspension systems repair

**AT 2413 Vehicle Transportation Economics**

Relation between transportation and economic – commercial engineering planning for transportation – factors affecting methods to choose different types of transportation–transportation cost – public transportation – transportation models – application on transportation models.

**HM 2414 Applied Environmental Sciences**

Definition of industrial pollutants and their sources – Combustion pollutants produced from combustion devices (industrial furnaces; boilers; gas turbines) – Kinds of internal combustion engines (gas; spark ignition; diesel) – Industrial pollution from different industries – Technology of pollution treatment.

**AT 2416 Profession Relationships**

Professional ethics in civil eng.- Relationship between the civil eng. and the client- Relationship between contractor and client (owner)-Relationship between contractor and civil engineer-Laws regulating the work at site-Builings law: Establishment; Development.

**AT 2437 Graduation Project**

Services stations planning for different types of vehicles – feasibility studies to build assembly factory for certain types of vehicles – modification of the vehicle petrol engine to natural gas engine – design of some vehicle parts – design and execution of vehicle with special specifications – study of vehicle environmental pollution minimization – detailed study of vehicle and tractor systems performance.

**AT2421 Vehicle Dynamics**

Vibration of vehicle parts – torsional vibration of transmission system – critical speed for propeller shaft – stiffness and damping of suspension system – characteristic of vehicle ride comfort – human response to vibration – vehicle ride models – introduction to random vibration – vibration of vehicle with relation by ISO curves of human ride comfort. – Characteristic of vehicle handling – vehicle steering geometry – steady state response to steering input – transient performance – handling tests.

**AT 2422 Vehicle Maintenance Engineering**

Surfaces connecting systems- mechanical connecting – physical an chemical connecting – friction – skidding friction – adhesive friction – wear- kinds of wear- physical properties of oils an their tests – dry lubrication and surfaces treatments hydraulic lubrication – engine oil and lubrication maintenance – cooling system maintenance – fuel systems maintenance – fuel feeding – carburetors – fuel injection- cylinder heads – valves and valves mechanism – block maintenance – cylinders maintenance – cylinders – pistons – connecting

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rods and rings – systems of engine diagnoses – clutch maintenance – transmission maintenance – brake system maintenance – planned maintenance and repair.

**AT 2423 Vehicle Automatic Control**

Application of automatic control in engine – application of automatic control in traction force – application of automatic control in vehicle brake – application of automatic control in steering systems – application of automatic control in suspensions systems – application of automatic control in integrated systems.

**AT 2424 Vehicle and Environmental Pollution**

Source of the environmental pollution - environmental pollution of vehicle exhaust gasses, fuel vapors and vehicles – control technique methods of exhaust gasses and fuel vapors – treatment of exhaust gasses – technique method of engine design and operation condition – instrumentation systems for measurement of vehicle pollutants – legislation and standard of vehicle pollutants.

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**AR 3131 Architectural Design (1)**

Identifying the design process and its variable dimensions/ Studying the distribution of main uses and how to connect them using circulation elements/ Studying qualitative and quantitative space needs for different activities/ Studying elevations and openings required for different spaces/ Linking among human, climatic and functional needs/ Studying simple structure for small buildings/ Training the student to solve simple design problems.

**AR 3132 Sciagraphy and Perspective**

Developing the imagination of space giving the possibilities of rendering space image in a practical manner/ Shading elevations to emphasize masses and their importance in architectural configuration/ Studying basic laws of sciagraphy: shade of points, lines, levels and masses/ Studying basic laws of perspective: picture plane, standing point, cone of vision, angle of vision, vanishing points, inverse perspective/ Drawing perspective using computer/ Training the student to catch shade and shadows of different forms: arches, staircases, terraces, openings, domes/ Training the student to draw the perspective of different forms and spaces using one-vanishing-point perspective/ Two-point- perspective/ Three-point- perspective/ Shade and shadow in perspective.

**AR 3133 Architectural Construction (1)**

Architectural building: basics and fundamentals of architectural building/ Architectural and constructive symbols and codes of materials/ Fundamentals of building works (stone, timber, masonry, concrete, steel) and types of building (skeleton, bearing walls)/ Arches/ lintel/ Staircases/ Means of isolation (moisture, heat, acoustic)/ Studying types of openings (doors, windows, etc.).

**AR 3114 Design Principles**

Developing the capacity to conceive, understand and design two-dimensional figures as well as three-dimensional spatial forms/ Working out to understand and conceive the basics of design including proportions, rhythm, harmony and contrast/ Identifying the functional basics of designing different architectural units taking into account the factors of efficiency, comfort and safety.

**AR 3115 Computer in Architecture**

An introduction to computer/ Operating system/ Components of the computer/ Applications of computer in preparing two-dimension architectural drawings/ Applications of computer in preparing three-dimension architectural studies.

**CV 3116 Structural Analysis**

Reactions – Normal forces – Shearing force and bending moment diagrams for statically determinate structures - Deformation of statically determinate systems.

**HM 3121 History of Architecture (1)**

The historic formation of architecture –aesthetic values of the historic architectural orders: analytic study of the influential factors that shape architectural styles and orders – origins of architecture and its evolution with emphasis on pre-historic, pharaonic, ashoric, greek and roman architecture.

**CV 3122 Plane Surveying**

Introduction – Scales – Verniers – Linear measurements – Simple instruments for angles measurement – Chain surveying – Leveling – Theodolite surveying – Map construction – Principles of photogrammetry – Photogrammetric applications in architecture.

**CV 3123 Properties of Building Materials**

Engineering materials – Standardization – Standard specification codes – Technical inspection – Building materials technology – Modern developments and innovative applications of building materials – Concrete technology – Reinforced concrete materials (aggregates – cement – mixing water – reinforcing steel) – Concrete production – Quality control of concrete works – Building units and portions – Gypsum – Lime – Timber – Stones – Adverse effect of water on building materials: Effluence – Chemical attack – Abrasion freeze – Flow attack – Mechanics of engineering materials -: testing machines and strain meters – Mechanical properties – Strength and behavior of materials subjected to static tension, compression, bending and shear.

**AR 3231 Architectural Design (2)**

Developing and orienting the student abilities to treat architectural design as a creation process to solve spatial problems on different levels of design (from the context and the layout to masses and spaces)/ Emphasizing the importance of construction in the formulation of inner spaces, and the architectural shape as a framework for the functional, social and cultural needs/ Architectural projects that cover different programmes and concepts/ Architectural programme/ Architectural form within the different concepts of space/ Understanding the dynamics of inner and outer spaces/ Architectural character and its urban, environmental, structural and symbolic references/ Dealing with structure as a constraint for the inner space and architectural form, as well as studying its organic, cultural and functional references in central-function buildings.

**AR 3212 Architectural Construction (2)**

Anatomy of different architectural and structural members – load transfer and loading methods, traditional construction methods, connections between different architectural and structural members – complementary items (suspended ceilings, curtain walls, light weight partitions) – reinforced concrete, steel, wooden wide span structures – new construction methods, site plotting of buildings – construction plans.

**HM 3213 Humanities in Architecture**

Identifying architecture as a framework for human science/ Understanding human considerations and concepts related to architectural design which can be considered as an approach for design based on human and behavioural needs/ Historic background/ Fundamentals of different theories/ Formation of communities/ Man-environment relationship/ Perception, behaviour and culture/ Mutual interrelationship between behaviour and built environment/ Special human needs in relation with social thoughts/ Human needs in modern architecture/ Scientific methodology of testing models, collecting data, and different methods of analysis/ Training the student to proceed a practical

applied research.

### **AR 3214 Theories of Architecture (1)**

Studying the philosophy and design considerations of public buildings including educational and cultural buildings, libraries, theaters, museums, healthcare facilities, recreational facilities, social centers, commercial buildings and shopping centers, as well as touristic buildings.

### **AR 3215 Technical and Sanitary Fixtures**

Introducing energy and the thermal field – environmental influences – thermal transfer, storage, and insulation – air conditioning and ventilation – mechanical ventilation – heating systemd – artifitial lighting – vision mechanisms – acoustics: nature of sound, sound analysis, noise, acoustical design of buildings and spaces – electrical installations: costs, maintenance, and systems integration – basics of elevator installation and its architectural requirements – laundry and kitchen equipment – hydraulic services: water supply and drainage – waste water and rain water – sanitary equipment in buildings – problems and solutions – fire fighting requirements – solid waste disposal – architectural applications.

### **CV 3216 Soil Mechanics and Foundations**

Soil properties - Soil classification - Stress transfer through soils – Soil Consolidation – Earthpressure – Design of shallow foundations – Pile foundations – Bearing walls – In-site soil investigations and selection of adequate foundation type.

### **AR 3221 Architectural Technology**

Technology principles – productions basics – mass production – machines – time and movement – production lines – workers and machines – incentives – architectural assembling – technologies of prefabricated buildings: Basics and methods – elements and components – manufacturing, transportation, and installation – maintenance, and support – basics of maintenance of diferent building components.

### **HM 3222 History and Theoreis of Planning**

Human settlements – old civilizations of Egypt, Eufates and tiger – settlement influential factors – urban centers of each - comparison of the greek and roman civilizations with respect to civilization charactersitics, practice, and urban centers of each. – civilization and city charactersitics of european medieval eras and Islamic medieval eras – industrial revolution and thoughts of the good society – introducing city planning, its goals and levels – the problems of current Egyptian cities – research training.

### **HM 3223 History of Architecture (2)**

This course aims at studying the evolution of thoughts that shape architecture at the beginning of the European Rainessance eras – comparative studies of architectural examples from the early Christian and coptic eras in Egypt, Besantine architecture, roman architecutre .

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**AR 3224 Environmental Control**

Building as a mediator between man and the surrounding environment and through the study of the thermal environment: components of climate, parameters that affect the site climate, climatic data and representations – thermal comfort chart – solar radiation – sun path charts – shading devices and its design – heat transfer between buildings and the environment – ventilation and air movement – openings and orientation – design goals of environmental control – design methods and architectural treatments of thermal environment.

**AR 3225 Computer Applications in Architecture**

Introducing computer capabilities in the area of architecture and urbanism – tools, techniques and applications that can be used during different procedures of building design, starting from programming phase, design representation and evaluation, preparation of 2d and 3d architectural drawings, programming and computer languages – use of computer in programming and architectural design.

**AR 3331 Architectural Design (3)**

Architectural design of complex, wide span buildings – data collection and analysis – design of projects with multiple buildings emphasising internal and external spatial relationships between different buildings and with the surroundings – issues of natural illumination and ventilation – artificial lighting and ventilation techniques and its application to relevant buildings – model making.

**AR 3332 Working Drawings (1)**

Development of initial project into a complete and detailed working project. In-depth study of various methods and materials of covering wide span spaces and its details – cladding of skeleton buildings – different metal sections and their use in openings and partitions design – stair types, different designs and materials – Architectural working drawings and detailing of different projects – sanitary and electrical drawings.

**AR 3313 City Planning**

Aims at enabling the student to appreciate city planning multi faceted problems with special emphasis on the Egyptian city, and practice of problem solving approaches – Studying city planning social, economical and cultural problems in Egypt, acknowledging the developing and developed countries experiences, and the different approaches of problem solving - City and its regions as a planning unit – Theory of comprehensive planning and gradual planning and its applications for the existing and new cities – Basis and theories of land use, residential areas and communities – Open spaces, business centers, services, agricultural areas, road networks.

**MH 3314 History of Architecture (3)**

Studying architectural thoughts and factors that foster the emergence of the European renaissance art and architecture, the artists of that era –philosophical framework of Islamic architecture – comparative analysis of a number of examples of Islamic architecture in the Arab region – Studying Islamic architecture in Egypt and the factors that affect its emergence and evolution



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during different Islamic eras.

**CV 3315 Reinforced Concrete**

Principles of design of reinforced concrete structures – Analysis and design of sections – Loads' distribution – Details of beam reinforcement – solid slabs – Stairs – Statically determinate frames – Hollow block slabs – Beams net – Flat slabs – Connections of precast structural units.

**AR 3321 Housing**

The problem of housing in Egypt –Housing processes and approaches – Housing prototypes – Planning and designing of residential areas, the economical, social, and environmental factors that affect it – Housing project involving surveys and evaluation of an existing residential area, and utilization of the findings in designing and planning of a new housing project.

**AR 3322 Theories of Architecture (2)**

Architectural trends in the 19<sup>th</sup> century as an introduction to modern architecture – Romantic architecture – The gap between architectural structuralism and the move toward eclecticism – bridging the gap in Europe and USA – Stages of philosophy and architectural development and changes during the 20<sup>th</sup> century.

**CV 3323 Steel & Wood Constructions**

Wooden and metallic construction materials: types and specifications – Allowable stresses in design calculations – Design of connections (rivets, bolted and welded) – Design of structural members and drawings of construction details for sections and connections of simple; composite and built up cross sections for: columns; tie beams under simple and biaxial bending and torsion.

**AR 3411 Architectural Design (4)**

Familiarizing the students with different design approaches – analytical study of different design alternatives for public and residential projects aiming to reach the best possible alternative with respect to architectural and urban form as well as different functional, structural, visual, and environmental requirements, yet respecting urban control legislations – Real projects of urban dimension and complex design alternatives – different methods of project presentation – model making.

**AR 3412 Working Design (2)**

Preparation of a complete set of working drawings applicable in reality or a previously designed student project involving wide span space.

**AR 3413 Urban & Regional Planning**

Planning, development, and settlement – general and skeleton planning of the city: process and stages of general plan preparation, regional framework – physical, economical, demographic, and social studies – the legislative framework – current conditions: the urban skeleton, land uses, problems, resources, obstacles – Goals and objectives – planning alternatives – evaluation and selection – means of execution and follow up – settlement studies – planning studies of different city elements and components –

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Theoretical and practical concepts of urban upgrading, improvement and community development.

**AR 3414 Landscape**

Identifying the outdoor space/ The historic evolution of gardens and parks/ Elements of landscape (plants, forms and levels of ground, water, light construction, flooring, outdoor furniture)/ Visual relationship/ Selecting materials/ Social and physiological factors that affect landscape/ Fundamentals of landscape.

**AR 3415 Environmental Design & Energy**

The inefficient use of energy in contemporary architecture – the efficiency of energy use in traditional architecture of different climatic regions –utilization of passive solar energy applications – energy conservation concepts and recycling – modern architectural trends and the efficient use of energy in the light of energy consumption rationalization concerns.

**AR 3437 Graduation Project**

Designing of graduation project for which the student had prepared a program and chose a location during the first semester. The project should be both complex and comprehensive to show student ability to utilize the experience gained during the study period in the department. The student should be able to meet project objectives both at the design level and the urban level.

**AR 3421 Construction Economics, Quantities & Specifications**

Training the student to prepare a complete set of working documents – bids – quantity calculation of different items – field quantity calculation and payment methods - specifications - cost analysis for materials and labor – timetables and the critical path method – use of computer in preparation of specifications and bills of quantities – building legislation, regulations and conditions - applications.

Calculations of Quantities: Excavation and Filling Quantities- Calculation of Plain and Reinforced Concrete and Steel Reinforcement Quantities- Calculation of Brick Walls Quantities- Calculation of Isolation Quantities- Cost Estimate-Final Invoice - Specifications; Types of Specifications - Specification Items and Their Uses - Methods of Formatting the Specifications for Different Works (Brickwork, Concrete, Isolation, Insulation) - Types of Contracts and Judgment.

**AR 3422 Urban Design**

Study of elements and styles of urban design – Principles of design of urban spaces in cities - Factors affecting the design decisions – Visual treatments in formation of urbanized spaces and elements of urban design – Regulations and standards for systems and legislations in urban design.

**BS 4111 Mathematics (2)**

Kinematics of rigid bodies – center of mass- moment of inertia -free and forced vibrations – work, energy and law of conservation- impulsive motion.

**BS 4112 Mechanics (2)**

Kinematics of rigid bodies – center of mass- moment of inertia -free and forced vibrations – work, energy and law of conservation- impulsive motion.

**CV 4113 Structure Analysis (1) (A)**

Introduction- Types of Structures – Reactions- Internal Forces in Beams - Internal Forces in Frames- Internal Forces in Trusses. Influence Lines- Normal Stresses- Shear Stresses- Compound Stresses- Torsion.

**CV 4114 Properties and Strength of Materials (1)**

Engineering Materials: Properties and Testing- Behavior of Engineering Materials Under Tension, Compression, Bending and Torsion Loading – Construction and Building Materials: Stones- Bricks- Wood- Lime- Gypsum. Concrete Materials: Cement – Sand – Gravel – Mixing Water- Additives- Steel Reinforcement- Concrete Industry: Concrete Mix Design – Quality Control- Workability of Concrete- Laboratory Testing.

**HM 4115 Technical English Language (2)**

Exercises related to scientific topics – Development of student's knowledge in language and ability for reading and understanding – Developing of understanding and translation abilities of the student – Developing of listening and speech abilities of the student – exercises on writing technical topics – readings in scientific books – methods of search – technical writing.

**CV 4116 Engineering Geology and Environmental Engineering**

Definition of the Environment – Introduction to Environmental Science – Atmosphere and hydrologic cycle – Air pollution – Water pollution – Soil pollution – Source of environmental pollution – Types of environmental pollution – Environment development – Environmental friendly projects: road improvement; potable water; drainage; building maintenance.

Rocks and Raw Materials and their Methods of Identification- Engineering Classification of Rocks- Physical and Engineering Properties of Rocks – Geological Constitutes: Faults- Layers- Gaps- Slides- Geological Survey – Geological Maps- Geological Studies for Design of Projects (Dams- Reservoirs- Tunnels- New Cities).

**BS 4121 Physics (2)**

Waves and vibrations- harmonic vibration in dynamical and electrical systems- geom. representation- interference -damped vibration- Fourier analysis of damped vibration- types of waves- wave velocity- velocity of sound waves in fluids- wave measurements- Doppler effect- electromagnetic waves- optics- optical interference- Newton ring – deviation – new concepts- quantum mech. - electro optical phenomena- laser – applications of sound waves - applications in mech. eng.

**CV 4122 Plane Surveying**

Introduction - Unites of Surveying Measurements - Chain & Detail Surveying - Cadastral map construction - Details of Maps - Scales -Areas Measurements and Calculation - Map Shrinkage - Compass Surveying - Magnetic north - Surveying and Prismatic Compasses - Compass Traverses- Plain Table Surveying - Theodolite Surveying -Introduction to Teodolites - Temporary Adjustment of the Theodolite and angles measurement - Leveling - Methods of levelling Works - Applications of levelling - Longitudinal and cross sectional levelling - Earth work calculations – Contour lines.

**CV 4123 Structure Analysis (1) (B)**

Influence Lines- Normal Stresses- Shear Stresses- Compound Stresses- Torsion.

**CV 4124 Civil Drawing**

Connections and Splices of Steel Structures- Retaining Walls (Buildings- Plain Concrete – Reinforced Concrete) – Curves and Slopes of Earth – Curves of Earth around Retaining Walls, Roads, Tunnels and Irrigation Structures – Projections of Irrigation Structures on Irrigation Channels ( Steel Bridges – Reinforced Concrete Bridges – Brick and Stone Arches – Culverts – Syphons – Aqueducts – Regulators – Weirs) – Details of pitching.

**EC 4125 Mechanical & Electrical Engineering**

Types and sources of electric current – Electric circuits for 3 phase DC and OC – Power stations – Transfer and distribution networks – Methods of energy storage – Electric systems for protection against lightening - Electric installations – Lighting systems – Wire and wireless communication systems – Locomotives – Construction equipments - Hauling equipments – Soil compaction equipments.

**AR 4126 Architectural Construction**

Introduction to main building items and construction materials – Finishing – Training to read and understand architectural drawings – Architectural expressions – Masonary construction – Stone construction – Archs - Frames – Domes – Insulating and isolating materials: types and use – Stairs in buildings: types; materials; design considerations – Architectural materials and finishing of floors; walls and ceilings – joints in buildings – Architectural solutions.

**CV 4211 Reinforced Concrete (1)**

Introduction to the Mechanical Properties of Concrete and Steel- Load Distribution on Beams- Design of Section under Bending- Shear Stresses- Details of Reinforcement for Beams - Design of Solid Slabs and Details of Reinforcement- Design of Sections subjected to Torsion- Working Limits of Concrete Beams- Design of Sections under Eccentric Loading- Design of Columns and their Detail of Reinforcement- Paneled Beams.

**CV 4212 Structure Analysis (2) (A)**

Calculation of Deformation- Consistent Deformation Method- Virtual Work Method- Conjugate Beam Method.

**CV 4213 Properties and Strength of Materials (2)**

Green Concrete: Consistency – Workability- Aggregate Segregation- Bleeding- Curing- Dry Concrete: Strength of Concrete, Strength Parameters, Types of Strength (Tension- Compression- Torsion) – Durability- Permeability of Concrete- Thermal Properties – Strains- Non-destructive Tests for Concrete- Fracture Mechanics of Materials- Creep of Materials- Properties of Materials Under Impact Loading- Fatigue.

**CV 4214 Topographic Surveying**

Introduction - Theodolite - Types - Components - Permanent Adjustment of Theodolite - Surveying using Theodolite - Theodolite Traverses, Calculation and Adjustment of Traverses - Tachometric Measurements - Electronic Measurement of Distances - Trigonometrical Leveling and Its Engineering Applications - Accurate Leveling and Its Engineering Applications - Surveying Alignment and Setting out of Curves - Construction and Use of Topographic Maps.

**CV 4215 Irrigation and Drainage Engineering**

Introduction to Irrigation and Drainage Engineering- Soil- Water Interaction- Water Duties- When Irrigation is needed- Agriculture and Irrigation Cycles- Irrigation Systems and their Areas in Egypt- Irrigation Methods- New Irrigation Systems- Sprinkler Irrigation – Drip Irrigation- Drainage- Drainage Systems- Alignment and Design of Irrigation Projects.

**HM 4216 Profession Relationships**

Professional ethics in civil eng.- Relationship between the civil eng. and the client- Relationship between contractor and client (owner)-Relationship between contractor and civil engineer-Laws regulating the work at site-Buildings law: Establishment; Development.

**CV 4221 Structure Analysis (2) (B)**

Structure Analysis of Statically Indeterminate Structures: Three moment Equation- Slope Deflection Method- Moment Distribution Method.

**CV 4222 Soil Mechanics**

Introduction - Terms and Definitions - Principal properties of Soil - Soil Classification - Permeability and Water Flow through Soil - Stress Distribution in Soil- Compressibility and Consolidation - Compaction of Soil.

**CV 4223 Photogrammetry and Remote Sensing**

Photogrammetry: Introduction – Aerial photogrammetry – Aerial photographs – Stereoscopic models - Mirror & prism stereoscopes – Modern stereoscopes – Flight planning – Use of aerial photographs in map construction and production – Some engineering Applications.

Remote Sensing: Introduction – Methodology – Photographic interpretation and analysis of digital and paper base photos – Engineering applications.

**CV 4224 Hydraulics (1)**

Properties of Fluids – Fluid Statics – Kinematics of Fluid Flow – Buoyancy and

Floatation – Energy considerations in Steady Flow – Fluid Motion – Similitude and Dimensional Analysis – Steady Incompressible Flow in Pressure Conduits: Laminar and Turbulent Flow – Friction and Minor Losses – Pipe Networks.

**CV 4225 Construction Project Management**

Introduction- Methods of Planning and Following up- Network Planning for Construction Projects- Time Scheduling- Scheduling of Project Resources- Neutral Line Planning Method for Projects- Using Computer in Project Management.

**BS 4226 Numerical Analysis**

Numerical solution of linear systems- numerical solution of nonlinear equations- interpolation-numerical integration and differentiation-curve fitting-optimization-numerical solution of ordinary and partial differential equations.

**CV 4311 Reinforced Concrete (2)**

Design of Hollow Block Slabs and Detail of Reinforcement- Design of Flat Slab-Stairs- Design of Frames and Detail of Reinforcement. Design and Detail of Reinforcement for Large Span Halls- Design of Hungers for Industrial Buildings- Design of Some Special Structures.

**CV 4312 Soil Mechanics and Foundations**

Shear Strength of Soil- Stability of Slopes- Soil Earth Pressure- Bearing Capacity of Soil- Soil Exploration- Shallow Foundations(A).

**CV 4313 Structure Analysis (3) (A)**

Analysis of Shells- Theory of Plates- Navier Method- Laivy Method.

**HM 4314 Engineering Economics**

Fundamentals of engineering economics – Construction economics – Housing economics – Transportation economics – Risk analysis – Fundamentals of civil engineering projects' evaluation – Accounting methods –

**CV 4315 Hydraulics (2)**

Uniform Flow in Open channels – Chezy and Manning Equations – Specific Energy – Critical Depth – Hydraulic Jump– Energy and Force Equations and Applications- Non-Uniform Flow in Open Channels – Flow Profiles– Laminar and Turbulent Flow in Open Channel– Introduction to Boundary Layer Theory– Separation and Vortex- Drag and Lift Forces for Submerged Bodies in Compressible and Incompressible Fluids- Hydraulic Machines- Pumps and turbines: Types, Performance and Testing.

**CV 4321 Design of Irrigation Structures (1)**

Design of Arch Bridges- Design of Steel and Wood Bridges- Design of Syphons- Design of Aqueducts- Design of Culverts- Design of Tail Escape-Lining Methods of Irrigation Channels.

**CV 4322 Steel Structures (1)**

Introduction- Tension Members- Compression Members- Beams- Columns-

Bolted and Riveted Connections- Welded Connection- Splices. Design of Built up Sections- Systems of Factory Halls and Steel Roofs- Composite Sections- High Rise Buildings- Workshop Drawings.

**CV 4323 Structure Analysis (3) (B)**

Circular Shells (Thin Plate Theory)- Cylindrical Shells (Beam Theory) - Elasticity Theory - Stiffness Method - Buckling of Columns.

**CV 4324 Engineering Geodesy**

Introduction- Study of the Earth Profile- Ropers of the Surveying Works- Ropers- Horizontal Constants- Triangles Networks- Methods of Measurements and Calculations- Vertical Constants- Precise Triangular Leveling- Theory of Errors- Methods of Correction of Surveying Measurements- Gyroscopic Determination of the North- Gyroscopic Deviation for the Networks – Map Projections- International System for Map Numbering.

**CV 4326 Transportation and Traffic Engineering**

Introduction- Transportation Planning- Transportation Systems- Transportation Planning Procedures- Trip Generation- Trip Distribution- Planning with Different Transportation Systems- Traffic Specialization- Traffic Engineering- Duties of Traffic Engineers- Behavior of Road Users- Traffic Volume- Speed and Delay Time Calculation- Types of Speed and Calculation of Delay Time- Types of Speed and Properties- Methods of Speed Measurement, Traffic Volume and Calculation of the Design Traffic Volume- Characteristics of Traffic Flow- Design of Traffic Intersections- Railways Engineering.

**CV 4431 Reinforced Concrete (3)**

Design of Reinforced Concrete Sections Using Crack Limit- Design and Detail of Reinforcement for the Rectangular and Circular Tanks- Design of the Deep Beams- Design of the surface Revolutions- Design of Circular Beams- Calculations of the Horizontal Load (Earthquakes, Wind) on the Building - Design of Circular Tanks, Surface Revolutions and Their Reinforcement Detail- Deep Beams- Introduction to the Prestressed Concrete.

**CV 4412 Steel Structures (2)**

Types of Bridges: Railway Bridges- Highway Bridges- Foot Bridges- Pony Bridges- Deck Bridges: Classification and Design of Bridge Elements- Design of Wind Resistant Elements- Design of Supports and Expansion Joints.

**CV 4413 Foundations Engineering**

Shallow Foundations (B)- Deep Foundations- Retaining Walls- Caissons- Dewatering of Ground Water.

**CV 4414 Design of Irrigation Structures (2)**

Water Control Structures- Weirs and Regulators- Design of Floors for the Water Control Structures- Navigation Locks- Storage Lakes- Dams: Classifications- Types- Ecological Studies- Stability of Dams- Protection of Dams.

**CV 4415 Highways and Airports Engineering**

Introduction- Geometric Design of Highways- Longitudinal Design (Horizontal and Vertical Curves)- Cross Sectional Design- Intersection Design- Effect of the Highways on the Environment- Structural Design for the Highways- Types of Pavement- Flexible Pavement- Properties of Pavement Layers and Their Functions- Properties of the Used Materials and Their Laboratory and Field Tests- Stress in Flexible Pavement- Design of Asphalt Mix- Design Methods- Rigid Pavement (Concrete Pavement)- Design Methods.

**CV 4421 Port Engineering & Inland Navigation**

Introduction to Winds and Astronomical Tides – Coastal Current – Bathymetric Survey – Wave Motion – Wave Reflection – Port Planning – Breakwaters – Inland Navigation – Design of Navigation Channels – Mooring and Navigation Signs.

**HM 4422 Technical Report Writing**

Introduction – writing of numbers; symbols; abbreviations and equations – Rules of statement writing; language; structure; accuracy; consolidation; variety; confirmation – variation of sentences – Easiness to read – Basic writing of active paragraph – How to start writing – summary and conclusion – writing and organizing the subject – Review and editing – Different forms of writing: letters; notes; proposals; reports; examples; references; tables and tables – Final edition of technical writing – Contacts writing.

**CV 4423 Sanitary Engineering**

Purification Works of Potable Water- Design of Purification Works- Treatment of Sewage Works- Design of Sewage treatment Works- Laboratory Tests for Water and Sewage Works.

**CV 4424 Specifications, Quantities and Contracts**

Contracts: Definitions, Formatting and Types- Components of Contracts (Main Points)- Tendering Procedures- Relationship Between Concerned People in Construction Projects- Stages Project Preparation- Tender Documents- Calculations of Quantities: Excavation and Filling Quantities- Calculation of Plain and Reinforced Concrete and Steel Reinforcement Quantities- Calculation of Brick Walls Quantities- Calculation of Isolation Quantities- Cost Estimate-Final Invoice - Specifications; Types of Specifications - Specification Items and Their Uses - Methods of Formatting the Specifications for Different Works (Brickwork, Concrete, Isolation, Insulation) - Types of Contracts and Judgment.

**CV 4427 B.Sc. Graduation Project**

The Student Prepares a Project in One of the Following Fields:  
Reinforced Concrete- Structural Analysis - Steel Structures- Properties and Strength of Material- Soil Mechanics and Foundations- Construction and Project Management- Design of Irrigation Structures, Irrigation Systems, Ground Water, Protection Against Floods or Port Engineering and Shore Protection- Hydraulics- Surveying- Highways- Sanitary and Environmental Engineering.