Technical College / Al-Najaf
   Department : Building & Construction Technology Engineering

   Subject: Computer Applications (2)
   Class : Third Year
   Hours : (1hour) Theoretical ,   (2hours) Practical

   Objectives :
   The students at the end of the year will be able to :
1. **complete all steps of creating the project plan**
2. **setting the Primavera program and creating new projects**
3. **defining the calendar system, Creating activity codes, adding and organizing activities, adding logic to activities, Creating and supporting resources, Evaluating the projects with resources and printing the records**
4. **use the engineering software programs related to its rules and theories has been taught to student previously.**

Week	Syllabus
1	**Introduction to: PROJECT MANAGEMENT WORKSHOP, Project Definition, project Management, Project stages, planning, activity list, Dependency list, logic network analysis, scheduling and critical path calculation,**
2&3	**Instilling Primavera Software, open a previous project, adding a new project, Describing the program screen, Adding activities to a project, Logic relationship, activity codes, Creation and Deleting Codes dictionaries, Creating and Deleting Activity and Default Activity code**
4	**DEFINING CALENDARS: Daily Calendar, Daily Base Calendar, adding colander to activities,**
5	**Activity Types**
٦	**Adding the Logic: Adding Relationship to the activities, Auto Link, Deleting Relationship, PERT View, Formatting your PERT View**
٧	**Constraints: Date Constraints, Float Constraints**
٨	**Scheduling the Project**
٩&١٠	**Formatting The Display : Toolbars, Columns, Formatting the Bars in the Bar Chart, Format Individual Bars, Format Sight Lines, Format Row Height, Format Fonts, Format Dates, Changing Language for Column Description And Timescale, Screen separator , Thousand Separator**

١١	**Filters & Layouts: understanding filters, Creating & Editing Filters , Understanding All & Any, Understanding Rolling Dates, Filter Levels, Modifying Filters, Replaying Filters**
١٢	**Layouts**
١٣&١٤	**Work breakdown Structure WBS:**
١٥	**Creating & Using Resources : Resources definition, Creating Resource, Assigning Resources to Activities, Resources dialog block, Costs dialog block, Assign Resources Against Multiple Activities, Summary Percent Calculation, Editing Resources Calendar, Editing a Resource Calendar, Resource Histogram, Resources Table, Printing tables and Layouts**
١٦	**Introduction to ConcAD v.1.52.**
١٧	**Review theories and formulas using in analysis and design of beams and columns.**
١٨	**Explain of the program interface and use the program to analysis and design of beams, columns and footings.**
١٩	**Explain of icons and description of input data.**
٢٠	**Discussion of the program results based on input data.**
21&22	**Examples and assignments with discuss the procedure of analysis and design different types of beams.**
23&24	**Examples and assignments with discuss the procedure of analysis and design of columns.**
25&26	**Examples and assignments with discuss the procedure of analysis and design of various types of footings.**
27&28	**Examples and assignments with discuss the procedure of analysis and design of torsion and shear reinforcements, development length of bars of a beam.**
29&30	**Examples and assignments with discuss the procedure of analysis and design of one way slabs.**

References :

1- تخطيط المشاريع باستخدام البرنامج بريمافيرا ، ترجمة الدكتور المهدس ابراهيم الحكيم ، شعاع للنشر والعلوم ، سورية – حلب ٢٠٠٢

2- Project Planning & Scheduling Using Primavera® P6, By Paul Eastwood Harris, http://www.damasgate.com/vb/t144508/

3- ا دارة المشروعات باستخدام برنامج (بريمافيرا انتربرايز Primavera Enterprise)
٣- المهندس خالد عبد العال http://www.damasgate.com/vb/t144508/

4- James, K. Nelson, JR. 1998. User Manual, Version 1.52, Addison Wesley Longman, USA.

5- Nilson, Arthur H. et al. 2004, Design of Concrete Structures, 14th edition, Chapter I9, McGraw-Hill Companies Inc., New york.

Technical College / Al-Najaf
Department : Building & Construction Technology Engineering

Subject : Engineering Management & Construction Equipments
Class: Third Year
Hours : 2 hr (theoretical) , 2 hr (practical)

Objectives:
Engineering Management : The student will learn the fundamentals of engineering management , planning , & costs , explained by solved problems for different construction projects .

Construction Equipments : The student must know the manual & technical skill to supervise different projects that use different types of construction equipments after graduate .

Week	Syllabus
1	**Introduction and historical review of project management.**
2&3	**Work breakdown structure and management triangle theory.**
4&5	**Critical path method (CPM): Calculation of activity durations, float time, calculation of critical path, advantages and disadvantages and examples.**
6&7&8	**Program (Project) evaluation and review technique (PERT): Calculation of activity most likely durations, float time, calculation of critical path, advantages and disadvantages and examples.**
9&10	**Description of activity durations, crantt chart as outline of critical path description, advantages and disadvantages and examples.**
11&12&13	**Crashing time method, description, advantages and disadvantages and examples.**
14&15	**Economical study on time value of money, advantages and and examples.**
16	**Introduction ,the role of equipments in various projects and its important in economic constructions , the controlling of material and equipments during construction stages .**

Technical College / Al-Najaf
Department : Building & Construction Technology Engineering

Subject : Systematic Training
Class : Third year

Week	Syllabus
8 weeks	**Practical training in building & construction engineering (site work) .**

وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
الكلية التقنية الهندسية / النجف
القسم : هندسة تقنيات البناء والإنشاءات

الخطة الدراسية

السنة الدراسية الأولى

الملاح٠	نوع المادة	عدد الوحدات	عدد الساعات			المادة	ت
			م	ع	ن		
	تخصصية	٧	٥	٣	٢	مواد الانشاء	١
	تخصصية	٦	٤	٢	٢	الميكانيك الهندسي	٢
	تخصصية	٧	٥	٣	٢	المساحة (١)	٣
	تخصصية	٤	٦	٦	–	الرسم الهندسي والهندسة الوصفية	٤
	مساعدة	٦	٤	٢	٢	الرياضيات التطبيقية	٥
تقييم ٠	مساعدة	٤	٦	٦	–	الورش الميكانيكية والمدنية	٦
	مساعدة	٤	٣	٢	١	مبادئ الحاسبة	٧
	تخصصية	٤	٢	–	٢	الجيولوجيا الهندسية	٨
تدرس باللغ	عامة	٤	٢	–	٢	حقوق الانسان والديمقراطية	٩
	عامة	٢	١	–	١	اللغة الانكليزية	10
		٤٨	٣٨	٢٤	١٤	المجموع	

ن : نظري
ع : عملي
م : مجموع

Technical College / Al-Najaf
Department : Building & Construction Technology Engineering

Subject: Analysis & Design of Reinforced Concrete Structures (1)
Class: Third year
Hours: 2hrs (Theoretical), 2hrs (Practical)

Objectives:
To develop an understanding of performance and design methodology for basic reinforced concrete structural elements.

Week	Syllabus
1&2&3	**Analysis of the structures:** Loads, Load combinations, Safety provisions of the ACI code, Analysis of beams and frames, ACI moment coefficients, Arrangement of live load.
4&5	**Materials:** Properties of concrete in compression, Modulus of elasticity, Stiffness, Properties of concrete in tension, Shrinkage and Temperature effects, Reinforcing steels for concrete.
6 &7& 8&9& 10&11	**Flexural analysis and design of beams:** Reinforced concrete beam behavior, Analysis of tension-reinforced rectangular beams, Design of rectangular beams, Design aids, Practical considerations in design of beams, Rectangular beam with tension and compression reinforcement, T-beams.
12&13& 14&15	**Shear and diagonal tension in beams:** Diagonal tension in homogeneous elastic beams, Reinforced concrete beams without shear reinforcement, Reinforced concrete beam with web reinforcement, ACI code provisions for shear design, Effect of axial forces, Deep beams.
16&17	**Analysis and Design for torsion:** Torsion in plain concrete members, Torsion in reinforced concrete members, Torsion plus shear, ACI code provisions for torsion design.
18&19& 20&21	**Bond, Anchorage and development length:** Fundamentals of flexural bond, Bond strength and development length, ACI- code provisions for development of tension reinforcement, Anchorage of tension bars by hooks, Development of bars in compression, Bar cutoff and bend points in beams, bar splices.

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject :Engineering Analysis
Class : Third year
Hours : 2hr (Theoretical) , 1hrs (Practical)

Objectives :
The student must know the advanced theories in mathematics & its applications in construction engineering .

Week	Syllabus
1&2	**Ordinary differential equations ,liner differential equations , homogeneous linear equations of the second order , general solution . basis initial value problem , homogeneous linear differential equations of arbitrary order n , equations of order n with constant coefficients , non homogeneous equations solving by the method of undetermined coefficient .**
3&4&5	**Applications of O.D.E of undetermined coefficient method in:, beam & column , beam-column, beam on elastic foundation , modeling : forced oscillation (dynamics analysis) .**
6	**Singular function : unit step function , unit impulse function ,unit moment function .**
7&8	**Applications of O.D.E of integration method in beams .**
9&10&11	**Fourier series ,Eular formulas , fourier series for any period (2L) , odd and even functions , Half – rang expansion , applications of fourier series in construction engineering .**
12&13& 14&15	**Partial differential equations , one dimensional wave equation , free longitudinal vibration of beam, free transverse vibration of beam, one dimensional heat equation , consolidation equation , two dimensional Laplace equation .**

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject : Soil Mechanics
Class : Third year
Hours : 3hrs (Theoretical) , 2hrs (Practical)

Objectives :
The student should understand the nature of soil , its formation , classification and engineering properties . The student should also know the behavior of soil under stresses , the effect of water flowing inside the soil , the using of soil as a construction material . The different methods used for testing the soil in laboratory and field should also be given to the student .

Week	Practical Syllabus
1	Field collection of a soil sample
2	Water content determination
3	Liquid &Plastic limits test
4	Shrinkage limit test
5	Specific gravity of soil solids
6	Total soluble salts & Organic matter content
7	Particle size analysis (Mechanical method)
8&9	Particle size analysis (Hydrometer method)
10	Classification of soil
11&12	Moisture- unit weight relationship (Compaction test)
13&14	Determination of in-place density of soil
15&16	Permeability tests (Constant & Falling head)
17&18&19	Consolidation test
20	Unconfined compression test
21	Direct shear test
22&23&24	Triaxial compression test
25&26	California Bearing Ratio test
27	Collapsing test
28&29	Swelling test
30	Relative density determination

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject : Soil Mechanics
Class : Third year
Hours : 3hrs (Theoretical) , 2hrs (Practical)

Objectives :
The student should understand the nature of soil , its formation , classification and engineering properties . The student should also know the behavior of soil under stresses , the effect of water flowing inside the soil , the using of soil as a construction material . The different methods used for testing the soil in laboratory and field should also be given to the student .

Week	Theoretical Syllabus
1&2	Soil formation , Types of soil
3	Geotechnical properties , Mineralogical composition
4&5&6	Weight –volume relationships , Grain size distribution , Soil classification
7&8&9	Hydraulic properties , Permeability of soil
10&11	Seepage & flow net construction
12	Effective stress & Pore water pressure
13&14& 15&16	Soil stabilization , Mechanical and chemical stabilization
17&18	Contact pressure and stress distribution
19&20& 21&22	Compressibility & Consolidation , Consolidation test , Settlement analysis
23&24& 25&26	Shear strength of soil , Mohr-Coulomb theory , Cases of shearing tests , Types of shearing tests .
27&28	Lateral earth pressure and retaining structures
29&30	Special types of soils , Collapsing & swelling soils

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject: Concrete Technology (2)
Class: Third year
Hours : 2hrs (Theoretical) , 2hrs (Practical)

Objectives:
The objectives of this subject are to give information about:
Properties of Fresh and hardened concrete; durability of concrete;
Concrete mix design; Special types of concrete; as well as, In-situ
tests.

Week	Practical Syllabus
1	**Review about cement and aggregates tests.**
2&3 **4&5**	**Fresh concrete tests: (Air content, Slump test, Compacting factor test, and V-B test).**

6&7
8&9
10&11
12&13&14
	Factors affecting compressive strength of concrete:
	  (a) Effect of water/cement ratio;
	  (b) Effect of cement content;
	  (c) Effect of age;
	  (d) Effect of end condition of specimen and capping;
	  (e) Effect of dimensions of specimen;
	  (f) Effect of curing conditions (Normal curing, Untreated curing, Autoclaved curing, Hot water curing); and
	  (g) Effect of shape of specimen.

15	**Indirect Splitting Tensile strength of concrete.**
16	**Flexural test (Modulus of rupture) of concrete.**
17	**Modulus of elasticity and Poisson's Ratio of concrete.**
18&19 **20&21&22**	**Project about mix design of concrete using (ACI, BRITISH, and CP : 110) methods.**
23&24	**Light weight concrete tests.**
25&26 **27&28** **29&30**	**In-situ Tests: (Rebound – Hammer Test, Ultrasonic Pulse Velocity Test, Load test, and Core test).**

References:
1.   **A.M. Neville, "Properties of concrete", 3rd. Ed., A Pitman International Text (1998).**
2.   **Troxell, Davis, and Kelly, "Composition and properties of concrete", McGraw-Hill book Company (1986).**
3.   **Iraqi (IS), British (BS), and American (ASTM) Standards for concrete testing.**

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject: Concrete Technology (2)
Class: Third year
Hours : 2hrs (Theoretical) , 2hrs (Practical)

Objectives:
The objectives of this subject are to give information about: Properties of Fresh and hardened concrete; durability of concrete; Concrete mix design; Special types of concrete; as well as, In-situ tests.

Week	Theoretical Syllabus
1	**General information about composition of concrete & properties of fresh concrete.**
2	**Properties of hardened concrete.**
3 & 4	**Kinds of strength.**
5&6	**Factors affecting strength of hardened concrete.**
7&8	**Factors affecting test results of strength of hardened concrete.**
9&10& 11&12& 13&14	**Concrete mix design.**
15&16	**Field adjustment.**
17&18	**Elasticity, dimensional stability (shrinkage & creep).**
19&20& 21&22	**Durability of concrete.**
23&24& 25&26	**Special types of concrete.**
27&28& 29&30	**In-situ tests.**

Technical College / Al-Najaf

Department : Building & Construction Technology Engineering

Subject: Theory of Structures
Class: Third year
Hours : 2hrs (Theoretical) , 1hrs (Practical)

Objectives :
 The student will be able to define all types of structures and their stability, define the methods of determination of the structure deformation under the load , study the methods of analysis and internal forces determination of determinate and indeterminate structures ,study the methods used for analysis of structural elements due to moving loads using the influence lines. The student will also learn the methods of structural analysis and the theories used, application of different methods of structural analysis and the methods of presenting the actual structure, connection between the theoretical analysis and the actual engineering structures.

Week	Syllabus
1&2	**Introduction** • **Definition of engineering structures** • **Classification of engineering structures** • **Forces applied on engineering structures** • **Types of loads and supports**
3&4	**Stability and determinacy of structures** • **Method used for stability of engineering structure** • **Stability and determinacy of beams** • **Stability and determinacy of trusses** • **Stability and determinacy of rigid frames**

5&6
&7&8
&9&10
	Statically determinate structures
	• **Statically determinate beams**
	  Drawing of shear force and bending moments diagram
	• **Analysis of statically determinate truss**
	• **Statically determinate rigid frames**
	  Drawing of shear force and bending moments diagram

11&12&13	**Influence line for statically determinate structures**
14&15&16	**Moving concentrated loads** • **Criteria for maxima** • **Absolute maximum bending moment**

Technical College / Al-Najaf
Department : Building & Construction Technology Engineering

Subject : Highway Engineering
Class : Third year
Hours : 2 hrs (Theoretical) , 2hrs (Practical)

Objectives :
The student must learn the geometrical engineering design of highways , The structural design of flexible & rigid pavements . The student must learn also, All the site works that may be needed for road construction & maintenance of pavements . The student can be able to accomplish the important tests of soil layers , asphalt and concrete pavements as well as he will have an important information about airport & railway engineering .

Week	Syllabus
1	Highways classification according to their functions , locations, and pavements types
2	Highway alignments and alternatives , points of inflections , topography terrain maps , cross-section elements , profiles , and horizontal and vertical curves
3	Horizontal curves , angle of inflections , middle ordinates , external distance , centrifugal forces , minimum radius and design speed .
4	Spiral curves and super elevation concepts .
5	Vertical curves , crest and sag curves , under crossing clear distance , minimum length and grades .
6	Sight distances , stopping and passing , at grade intersection , at vertical curves , relation between length of curve and required sight distance and between middle ordinate distance .
7	Traffic volumes , counting , traffic volume correction factors , level of service (LOS) , AADT, ADT , DHV , …..
8&9	Traffic loads ,equivalent single axle load (ESALs) , tandem axle load, tridem axle loads , load damage factor , growth factor , stresses on pavements .
10&11	Design of flexible pavement, pavement layers , charts for design
12&13	Design of rigid pavement, pavement layers , charts for design