



Arab Academy for Science, Technology & Maritime Transport
College of Engineering & Technology
Department of basic and applied sciences

University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Mechanical Engineering

Form No. (12)
Course Specification

1- Course Data

Course Code: BA 323	Course Title: Math 5	Academic Year/Level: 3rd year / 5th semester	
Specialization:	No. of Instructional Units	Lecture	Practical
	3 Credits	2 Hrs.	2 Hrs.

2- Course Aim

When dealing with some physical problems, an ordinary or partial differential equation arises. Our course aims to give the student the ability to extract exact solutions of these problems.

3- Intended Learning Outcome (ILO's)

a- Knowledge and Understanding	<p>K1) Concepts and theories of mathematics and sciences, appropriate to the discipline. Recall classification of D.E. Define ordinary and singular points for a linear D.E. with variable coefficients. Describe the form of solution about ordinary point. Describe the form of solution about a regular singular point Define Gamma function Define Beta function.(K1) Relate Beta and Gamma functions Define Bessel D.E Define Bessel functions List Bessel functions identities Define Legendre D.E Define Legendre polynomials. List Rodrigue's formula, orthogonality property, recurrence relation and generating function for Legendre polynomials. Define classical PDEs and boundary value problems (BVPs). Explain the solution of the (BVP) of an oscillating (vibrating) string using separation of variables method Explain the solution of the (BVP) of heat transfer in a thin rod using separation of variables method. Define a complex function Relate Complex functions as mappings Define conformal mappings Define a linear fractional transformation.</p>
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<p>b- Intellectual Skills</p>	<p>I2) Select appropriate solutions for engineering problems based on analytical thinking. Identify a given point x_0 as ordinary or singular. Identify a given singular point x_0 as regular or irregular point. Solve D.E. using series solution method about an ordinary point Solve D.E. using series solution method about a regular singular point. Evaluate integrals using Gamma function. Evaluate integrals using Beta function. solve D.E in terms of Bessel functions Evaluate integrals and proving formulas using Bessel identities Solve D.E in terms of Legendre polynomials. Evaluate integrals using properties of Legendre Polynomials.</p>
<p>c- Professional Skills</p>	<p>P1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems. Inspect which integrals can be solved using Gamma function Inspect which integrals can be solved using Beta function. Inspect which D.E can be solved using Bessel functions. Inspect which D.E can be solved using Legendre polynomials.</p>
<p>d- General Skills</p>	

4- Course Content

Lecture		
Wk	Hrs	
1	2	Classification of differential equations
2	2	Series solution about an ordinary point
3	2	Frobenius method
4	2	Gamma function
5	2	Beta function
6	2	Solution of Bessel D.E.
7	2	7 th week exam
8	2	Bessel Identities
9	2	Solution of Legendre D.E
10	2	Properties of Legendre polynomials
11	2	PDE (Method of separation of variables)
12	2	12 th week exam
13	2	Heat and wave equations
14	2	Conformal mapping (Linear Fractional mapping)
15	2	Revision
16	2	Final Exam

5- Teaching and Learning Methods

<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 3. Individual and group course homework
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6- Teaching and Learning Methods for Students with Special Needs

<ol style="list-style-type: none"> 1. Consulting with lecturer during office ours 2. Consulting with teaching assistant during office hours 3. Private sessions for redelivering the lecture contents An academic supervisor is appointed for 4. handicapped students. Constant follow ups are done for handicapped students after each assessment to evaluate their academic level of achievement.

7- Student Assessment

a- Procedures used:	<ol style="list-style-type: none"> 1. Written examinations to assess the Intended learning outcomes. Continuous assessment (reports, discussions, etc.....) to assess the Intellectual skills.
b- Schedule:	Assessment 1: 7 th Week Written Exam Assessment 2: 12 th Week Written Exam Assessment 3: Continuous Assessments Assessment 4: 16 th Week Final Written Exam
c- Weighing of Assessment:	7 th Week Examination : 30 % 12 th Week Examination: 20 % Final-term Examination: 40 % Oral Examination : 0 % Practical Examination : 0 % Semester Work : 10 % Total : 100%

8- List of References:

a- Course Notes	Prepared by Lecturer
b- Required Books (Textbooks)	Advanced Engineering Mathematics, Erwin Kreyszig
c- Recommended Books	Advanced Engineering Mathematics, D. G. Zill, W. S. Wright
d- Periodicals, Web Sites, ..., etc.	

Course coordinator:

Program Manager: