TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Chemical Engineering Department
3. Course title/code	Mechanics and Strength of Materials /132
4. Programme(s) to which it contributes	CE.132, ME454,BE.1101
5. Modes of Attendance offered	Fall
6. Semester/Year	2 semester/year
7. Number of hours tuition (total)	3
8. Date of production/revision of this Specification	13-05-2016
9. Aims of the Course	
1. To understand the basic principles that govern the static equilibrium of bodies under the action of forces	
2. To apply the knowledge and tools of statics to solve engineering problems	
3. To provide the basic concepts and principles of strength of materials.	
4. To give an ability to calculate stresses and deformations of objects under external loadings.	
5. To give an ability to apply the knowledge of strength of materials on engineering applications and design problems.	

10· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

A1. Analyze forces on rigid bodies in equilibrium.

A2. Communicate analysis and results clearly: orally, in writing, and through diagrams and calculations.

A3. Analyze and design structural members subjected to tension, compression, combined stresses and bending using the fundamental concepts of stress, strain and elastic behavior of materials.

A4.Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.

B. Subject-specific skills

B1. Apply knowledge gained in this course in subsequent engineering courses such as Strength of Materials, Dynamics, Fluid Mechanics, and many others.

Teaching and Learning Methods

Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems

Assessment methods

Midterm exams , Final exam , Quizzes, Weekly homework, Team and homework problems , partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

C. Thinking Skills

C1. Analysis of an engineering problem begins with a simplified model of the actual solution.

C2. A large complex problem consist of many inter related smaller problems which must be solved in a logical order.

Teaching and Learning Methods

Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems , Analysis of cases linked to the work environment , Practical Applications

Assessment methods

Midterm exams , Final exam , Quizzes, Weekly homework, Team and homework problems , partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

D. **General and Transferable Skills (other skills relevant to employability and personal development).**

D1. There is often more than one correct approach to the solution of an engineering problem. Shearing ideas with others will often lead to the most efficient or clearest solution.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st semester					
1	3	Introduction to principles of statics Dynamics and rigid bodies	Principles of statics, Dynamics and rigid bodies	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
2	3	Explain the arrangement where two or more forces act on body or on a group of related bodies	Force Systems	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
3	3	Defined the Scalar and Vector quantities	Scalar and Vector Quantities:	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
4	3	Find resultant of two or more force vectors	Resultant of force system	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

5	3	Composition and Resolution of Forces using principle of projection	Principle of Projection	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
6	3	Find resultant of equivalent force couple pairs	Couples	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
7	3	Write and solve equilibrium equations using summations of forces	Equilibrium of a force system	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
8	3	Calculate the moment of a force about a point.	Moment of a force	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
9	3	Define and use the theory of friction	Friction	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

10	3	Solve problems involving particles and rigid bodies with frictional surfaces: in equilibrium, in accelerated motion, at impending sliding, at impending tipping.	Friction on an horizontal plane	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
11	3	Solve problems involving particles and rigid bodies with frictional surfaces: in equilibrium, in accelerated motion, at impending sliding, at impending tipping.	Friction on an inclined plane	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
12	3	Calculate the centroid and center of gravity of a composite area.	Centroid and center of gravity	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
13	3	Calculate the centroid and center of gravity of a composite area.	Centroids Determined by Integration method	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer ,
14	3	Find the moment of inertia of a composite area.	Moment of inertia	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
15	3	Find the moment of inertia of a composite area by integration.	Moment of inertia by integration method	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer ,
2nd semester					

16	3	Introduction to relations between externally applied loads and their internal effects on bodies	Strength of materials	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
17	3	Define direct normal stress and direct shear stress and compute their value.	Analysis of internal force	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do
18	3	Define normal tensile and compressive stress and compute their value.	Normal stress	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
19	3	Define shear stress and compute their value.	Shear stress	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
20	3	Define the normal strain and compute their value.	Normal strain	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
21	3	Define the shearing strain and compute their value.	Shearing strain	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

22	3	Define proportional limit, elastic limit, yield strength, ultimate strength,	Stress – Strain diagram	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite
23	3	Define Hooks low	Hooks law	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
24	3	Explain the shearing deformation and the relation between shearing stress and shearing	Shearing deformation	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
25	3	Defined the composite stress within elastic limit	Composite stress	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite
26	3	Defined the Poison's ratio composite stress within elastic limit	Poison's ratio	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite
27	3	Find the volumetric strain in two cases, cube and cylindrical bar.	Volumetric strain	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

28	3	Calculated the thickness of thin wall of cylinders and spheres.	Thin walled	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
29	3	Define the thermal stress	Thermal stress	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer
30	3	Develop an understanding of models and procedures used in the analysis of transversely loaded beams and shafts with various support conditions.	Shear and bending moment in beam	Lectures, Example Classes, Tutorials	partial test (Oral questions :- multiple choice ,alternative response), Open questions that have a definite answer , or do not have a definite answer

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	• Lecturers • Book 1. Engineering mechanics / Statics and dynamics by Higdon and Stiles. 2. Strength of Materials by Ferdinand L. Singer and Andrew Pytel. • Other support books :- Engineering mechanics / Statics and dynamics by A.K. Tayal
Special requirements (include for example workshops, periodicals, IT software, websites)	Websites
Community-based facilities (include for example, guest Lectures , internship , field studies)	Non

13. Admissions	
Pre-requisites	Graduated from secondary school
Minimum number of students	Central admission
Maximum number of students	Central admission