CAD

PREPARED BY – DR. RANBIR SINGH

BML MUNJAL UNIVERSITY

67th MILESTONE, NH-8, SIDHRAWALI, GURUGRAM, HARYANA-122413

Contents

2. VISION AND MISSION OF THE UNIVERSITY

Named after the chairman and founder of the Hero Group, **Brijmohan Lall Munjal, BMLMunjal University** is engaged in creating, preserving, and imparting internationally benchmarked knowledge and skills to a diverse community of students from across the world. BMU's aim is to nurture ethical leaders who are skilled, knowledgeable and have thelife skills needed to lead organizations to success.

Vision

BML Munjal University seeks to nurture ethical leaders who are skilled, knowledgeable and have the life skills required for leading their organizations to success.

The university shall seek the advancement and dissemination of practically oriented knowledge benchmarked with the best global standards.

Mission

BML Munjal University aims to be a leading university for the quality and impact of its teaching, research, and linkages with major stakeholders. The focus of the university is to find creative solutions to problems through application of knowledge. The university aims to create a talented community of students and faculty who excel in teaching, learning andresearch, in a creative and stimulating environment. The university will collaborate with other institutions for the development of science, technology, and arts in the global context.

3. GRADUATE ATTRIBUTES

BMU students will:

1. Acquire and apply practical understanding of discipline knowledge.
2. Demonstrate a sense of ethics and display excellence in both personal and professional life.
3. Exhibit problem solving, critical thinking skills and investigative capability to address realworld problems.
4. Manifest leadership qualities and work effectively in teams across globally diverseenvironments.
5. Be a lifelong learner with an entrepreneurial mindset to innovate in the constantly changing global scenario.
6. Possess a strong sense of inquiry and design innovative solutions for positive societalimpact.
7. Be effective communicators and possess an empathetic outlook.

4. VISION & MISSION OF THE SCHOOL OF ENGINEERING AND TECHNOLOGY

VISION – BMU SOET

To be amongst the leading engineering schools of the country recognized globally for excellence in teaching and research with focus on experiential learning, innovation, and entrepreneurship.

MISSION – BMU SOET

Providing high-quality learning experience to our students, preparing them to be global leaders, and contributing to the development of society through research, innovation, and entrepreneurship.

Creating an inclusive and diverse learning environment that fosters creativity, critical thinking, and ethical values.

Collaborating with industry, government, and other institutions to address complex societal challenges and promote sustainable development.

5. PEOS, PO & PSO

PROGRAM EDUCATIONAL OBJECTIVES (PEO): ME

PEO 1: Analyze mechanical systems with design engineering, thermal engineering, manufacturing, and allied engineering concepts by applying mathematics and sciences.

PEO 2: Demonstrate multi-disciplinary knowledge to analyze, interpret and create solutions to real-life mechanical engineering problems.

PEO 3: Embrace capability to expand horizons beyond engineering for creativity, innovation, and entrepreneurship.

PEO 4: Imbibe ethics and professionalism to act responsibly towards social and environmental issues with a focus on welfare of humanity.

PROGRAM OUTCOMES (PO): ME

Graduates will be able to:

PO 1: Apply the knowledge of mathematics, science, and engineering fundamentals to solve complex problems in the different mechanical engineering fields.

PO 2: Identify, formulate, review, and analyze complex engineering problems by using appropriate mathematical and scientific methods, tools, and techniques to evaluate solutions and reach substantiated conclusions by using the domain knowledge of mechanical engineering.

PO 3: Design appropriate mechanical systems and prototypes through analysis of various components by working within the constraints which may include parameters encompassing social, economic, environmental, health and safety, manufacturability, and sustainability components.

PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to mechanical engineering problems.

PO 5: Apply appropriate techniques and tools to solve complex mechanical engineering problems by effective usage of IT resources with an understanding of the limitations.

PO 6: Apply contextual knowledge and appropriate reasoning to assess societal, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Understand the impact of mechanical engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of professional engineering practice.

PO 9: Function effectively as a reliable and responsible individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communicate effectively on complex engineering activities specifically with the vast engineering community and in general with the society at large and should be able to comprehend and write effective reports and design documentation, make effective presentations using various tools, and give out and receive clear instructions.

PO 11: Demonstrate knowledge and understanding of the mechanical engineering area as well as in all interdisciplinary engineering fields and should be able to effectively apply management principles to manage large-scale projects.

PO 12: Recognize the need for and importance of learning advanced technologies and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change through both online and offline modes.

PROGRAM SPECIFIC OUTCOMES (PSO): ME

PSO 1: Demonstrate mechanical engineering knowledge to understand, design, apply and solve engineering problems related to the Automobile sector.

PSO 2: Analyze and design manufacturing automation, robotics, and mechatronic systems within realistic constraints.

6. COURSE DESCRIPTION AND ITS OBJECTIVES

Course Code: MEC 2734	Course Title: Computer Aided Design (CAD)
Credits: [2 - 0 – 0] (2 credits)	Contact Hours per Week = 02 Hours
Faculty in-charge: Dr Ranbir Singh	ranbir.singh@bmu.edu.in

Aim of the course: This course is designed for undergraduate students of Mechanical Engineering and aims to discuss basic concepts of computer graphics in drawing and modelling.

Course Overview and Context: This course for undergraduate students of Mechanical engineering aims to discuss basic concepts of Computer Aided Design/ Drafting (CAD). The course will impart technical understanding of CAD systems & their application to the students. The course endeavors to deliver basic learning about transformations and geometric modelling techniques used in different CAD systems, covering wireframe, surface & solid modelling techniques and data exchange standards with application to CAM.

7. COURSE LEARNING OUTCOMES AND CO-PO MAPPING

CO1: Apply understanding & Knowledge of basic sciences, computer, and math to learn CAD systems & capabilities.

CO2: Analyze 2-D and 2-D CAD modeling methods and techniques.

The following is the CO-PO mapping for the course. For details about POs and PSOs, please refer to the OBE document. Here "3" refers to strong mapping and "1" refers to weak mapping.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2		2	3	2			2				2		3	3

Note: For details about PO, PSO, and CO-PO mapping, refer to OBE document for B. Tech. – ME program.

8. COURSE SYLLABUS

Introduction to CAD: Product life cycle management (PLM) & importance of CAD in PLM, basic architecture of CAD systems & its effective use in geometric modeling.
Geometric transformations: 2-D & 3-D transformations.
Geometric modeling: Introduction to Wireframe modeling, Surface modeling & Solid modeling with view & Control via sketch planes, geometric aid & manipulation tools.
Wireframe modeling (Introduction, parametric & non-parametric formulation, and application): Analytic type: Point, Straight lines, Arc, Circles, Ellipse, Parabola, hyperbola & Synthetic type: Hermite cubic spline, Bezier curves, B-spline curves & non-uniform rational B-splines.
Surface modeling (analytical & synthetic): plane surface, ruled surface, surface of revolution, tabulated surface, Hermite Bi-cubic surface, Bezier surface, B-spline surface & coons' surface.
Solid modeling: Boundary representation (BREP), Constructive solid geometry (CSG), Sweep representation, Primitive instancing, Cell decomposition & Analytical solid modeling.
Data exchange standards (LAB): IGES, STEP & STL translators, preprocessors and postprocessors, translator testing for correct data conversion and Tool path generation from CAD system.

9. DETAILED SESSION WISE PLAN

S. No.	**Topic/ module**	**# Sessions**
1	Introduction to CAD	4
2	Geometric transformations	4
3	Geometric modeling	6
4	Wireframe modeling	4
5	Surface modeling	4
6	Solid modeling	4
7	Data exchange standards	3

10. WEEKLY TIMETABLE

	9:15-10:10	10:15-11:10	11:15-12:10	12:15-01:10	01:15-02:10	02:15-03:10	03:15-04:10	04:15-05:10
MON								
TUE								
WED			CAD					
THU			CAD					
FRI								

11. REGISTERED STUDENTS LIST & ATTENDANCE

S. No.	Enrolment No.	Name	Attendance	(%)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	29/31	93.55
2	220C2050004	Manav Agarwal	30/31	96.77
3	231C2050001	Sagar Saini	25/31	80.65

12. DETAILS OF INTERNAL ASSESSMENTS, WEIGHTAGES & MAPPING TO CO

S.n.	Component	Duration	Weightage (%)	Evaluation Week	COs	Topic covered
1	Assignment	-	10 %	4rd week	CO1, CO2	Geometric transformations & Geometric modeling
2	Quiz	20 min	10 %	8th week	CO1, CO2	Wireframe modeling
3	Mid-term Exam	-	20 %	12th week	CO1, CO2	Surface modeling
4	Class participation	20 min	20 %	15th week	CO1 & CO2	Solid modeling
5	End term assessment: Presentation + viva + report	30 min	40 %	15th week	CO1 & CO2	Whole syllabus

13. QUIZ/ ASSIGNMENT QUESTION PAPERS WITH SAMPLE SOLUTIONS

ASSIGNMENT (10% WEIGHTAGE) (Sept 2023)

Answer the following questions (do not copy the answers from the provided study material).

1. Discuss the evolution of the CAD systems with respect to the business drivers.
2. Evaluate the system, geometric modelling, and design documentation related issues for selection of a CAD system.
3. Present day CAD systems has re-revolutionized the industrial sector. Support your reply with suitable examples.

ASSIGNMENT MARKS RECORD			
Sr No	Roll No.	Student Name	Out of (10)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	9
2	220C2050004	Manav Agarwal	8
3	231C2050001	Sagar Saini	6

QUIZ (10% WEIGHTAGE) (9th NOV 2023)

(2.5 x 4 = 10 Marks)

Answer the following questions:

1. Illustrate the method of defining the following analytical entities:

A. Line

B. Ellipse

2. Demonstrate non-parametric representation of curves in CAD.

3. Discuss of concept of continuity with respect to CAD curves/ surfaces.

4. Elaborate the concept of Hermite Cubic Spline Curves.

QUIZ MARKS RECORD			
Sr No	**Roll No.**	Student Name	Out of (10)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	3
2	220C2050004	Manav Agarwal	1
3	231C2050001	Sagar Saini	2.5

MID TERM EXAM (20% WEIGHTAGE) (18th OCT 2023)

Answer the following questions:

1. List 10 business drivers of product life cycle (3 marks)
2. How computer assists to design cycle? Discuss with neat sketch/ block diagram. (4 marks)
3. What do you mean by Geometric transformations. (3 marks)
4. What is homogenous geometric transformation? Discuss (5 marks)
5. How geometric modelling depends on geometry and topology. Discuss. (5 marks)

MID TERM MARKS RECORD			
Sr No	**Roll No.**	Student Name	Out of (20)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	12
2	220C2050004	Manav Agarwal	5
3	231C2050001	Sagar Saini	10.5

14. SAMPLE EVALUATED INTERNAL SUBMISSIONS & IDENTIFICATION OF LEARNERS DIVERSITY

All students are excelled learners. They are given tasks of advanced learners.

CLASS PARTICIPATION Marks Record			
Sr No	Roll No.	Student Name	Out of (20)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	16
2	220C2050004	Manav Agarwal	16
3	231C2050001	Sagar Saini	15

15. REFLECTIONS FROM THE QUIZ EXAM FEEDBACK AND INTERVENTIONS MADE

The students are advanced level learners.

16. INTERVENTIONS MADE FOR SLOW PERFORMERS & ADVANCED LEARNERS

Advanced learners:

The learners were motivated to write research articles.

17. END SEMESTER QUESTION PAPERS WITH SAMPLE SOLUTIONS

END TERM EVALUATION

It was a seminar cum presentation evaluation.

18. FINAL RECORD OF RESULTS

Sr No	Roll No.	Student Name	Assignment	Mid Term exam	Quiz	Class Participation	END Sem Eval.	Total
			(10)	(20)	(10)	(20)	(40)	(100)
1	220C2050002	Laxmi Siva Narayana Swamy Asapu	9	12	3	16	29	69
2	220C2050004	Manav Agarwal	8	5	1	16	27	57
3	231C2050001	Sagar Saini	6	10.5	2.5	15	25	59

19. ANALYZING DIRECT FEEDBACK RECEIVED ON COURSE OUTCOMES

The performance of the students was found to be above average. The feedback was also quite high i.e. 5.

20. CO ATTAINMENT MEASUREMENT ANALYSIS

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School of Engineering and Technology

BML Munjal University, 67th Milestone, NH 48, Kapriwas, Haryana 122413

Course Outcome Attainment

Programme Name : School Of Engineering and Technology- B.Tech ME
Term : III Sem
Section : 2022-2026 Section-MEC
Course Name : CAD (Pattern - 2020)
Faculty Name : Dr Ranbir Singh

Target Attainment		Level
70%	Students scoring more than the Target Percentage	3
60%	Students scoring more than the Target Percentage	2
50%	Students scoring more than the Target Percentage	1

Course Outcomes	CO1	CO2	CO3
Weights	21%	23%	27%
No. of students scored >=3	3	3	3
% age of students scored >= 3	100%	100%	100%
Attainment Level	3	3	3
Overall Course Attainment	2.13		

Contribution to attainment of Program Outcomes

CO	Attainment	STATEMENT	Bloom's Level	Correlation with POs and PSOs													
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3.00	CO1: Apply understanding & Knowledge of basic sciences, computer, and math to learn CAD systems & capabilities.	L3 – Apply	3	2												
CO2	3.00	Analyze 2-D and 2-D CAD modeling methods and techniques	L4 – Analyse		2	3	2			2				2		3	3
		Program Attainment		3.00	3.00	3.00	3.00			3.00				3.00		3.00	3.00

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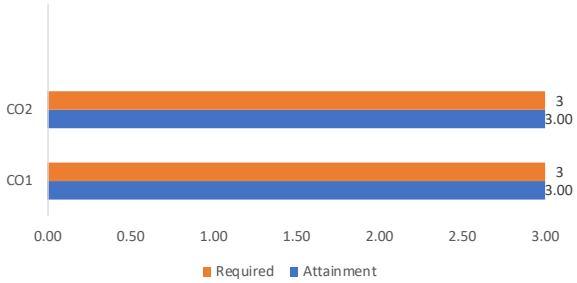
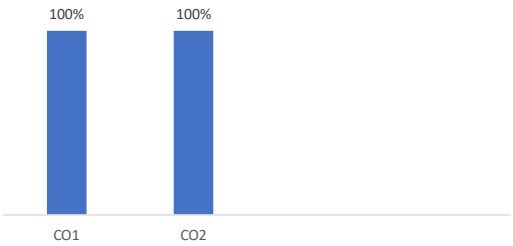
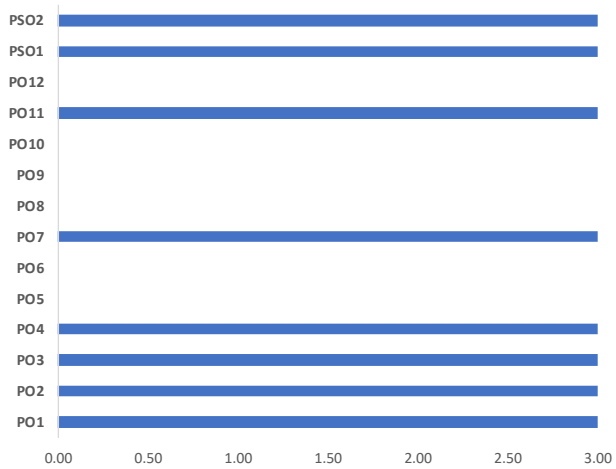
Course Outcome Attainment



% age of students scored >= 3



Program Attainment



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Student Outcome Attainment

Programme Name : School Of Engineering and Technology- B.Tech ME

Term : III Sem

Section : 2022-2026 Section-MEC

Course Name : CAD (Pattern - 2020)

Faculty Name : Dr Ranbir Singh

Total Number of Students: 3

Sr. No.	Roll No	Student Name	CO1	CO2
1	220C2050002	Laxmi Siva Narayana Sw	3	3
2	220C2050004	Manav Agarwal	3	3
3	231C2050001	Sagar Saini	3	3

21. FEEDBACK & CORRECTIVE ACTIONS (IF ANY)

Faculty Report

SoET Mid Sem Feedback AY 23-24
Faculty Name : Dr. Ranbir Singh

(1-Never 2-Rarely 3- Sometimes 4-Often 5- Always)

Subject Name : MEC2734- COMPUTER AIDED DESIGN (CAD)

Course Evaluation Parameters	Never	Rarely	Sometimes	Often	Always	Total Number of Student	Average Grading	Overall Average Grading	MIN	MAX
I feel that the instructor engages my interest.	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel the instructor covers the course in depth and in detailed manner.	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel encouraged to participate/discuss in the class.	0	0	0	0	0	0	NaN	?	0.00	0.00
The assignments/quizzes/projects stimulate my interest in the course and motivate me to explore further.	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel the faculty is fair/unbiased in evaluation and the assessments are conducted in a timely manner.	0	0	0	0	0	0	NaN	?	0.00	0.00
I find this course enhances my experiential learning/Problem solving abilities.	0	0	0	0	0	0	NaN	?	0.00	0.00
I find the faculty regular and punctual to the class.	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel the faculty can handle the class quite well.	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel the faculty Communicates clearly and is audible	0	0	0	0	0	0	NaN	?	0.00	0.00
I feel course is implemented as per course handout	0	0	0	0	0	0	NaN	?	0.00	0.00
I find the faculty to be interested and enthusiastic in teaching the course.	0	0	0	0	0	0	NaN	?	0.00	0.00
(1-Never 2-Rarely 3- Sometimes 4-Often 5- Always) Average							NaN			

Feedback Given By Student

22. FACULTY COURSE REVIEW

The course is successfully completed with fruitful learnings by the students.