Course File

Academic Year : **2018-19 ODD semester**

Semester/section : **III – A-section**

Course Name : **Material Science**

Course Code : **17ME32**

Course Index : **C202**

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

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VISION AND MISSION OF THE INSTITUTE AND DEPARTMENT

VISION OF THE INSTITUTION

"To Produce Professionally Excellent, Knowledgeable, Globally Competitive and Socially Responsible Engineers and Entrepreneurs'.

MISSION OF THE INSTITUTION

M1	To provide quality education in Engineering and Management.
M2	To establish a continuous Industry Institute interaction, Participation and Collaboration to contribute skilled Engineers.
M3	To develop human values, social values, entrepreneurship skills and professional ethics among the technocrats.
M4	To focus on innovation and development of technologies by engaging in cutting edge research areas.

VISION OF THE DEPARTMENT

"To Produce Professionally Excellent, Knowledgeable, Globally Competitive, Socially Responsible Mechanical Engineers and Entrepreneurs".

MISSION OF THE DEPARTMENT

MD1	To Provide Quality Education in Mechanical Engineering and Management.
MD2	To Establish a Continuous Industry Institute Interaction, Participation and Collaboration to Contribute Skilled Mechanical Engineers.
MD3	To Impart Human, Socio-Ethical values and Entrepreneurship skills among Mechanical Engineers.
MD4	To Promote Research and Development (R & D) and Innovative Technologies in the Emerging Areas of Mechanical Engineering.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

PEO1	Graduates of Mechanical Engineering shall Develop Strong Academic Foundation for Successful Professional Career.
PEO2	Graduates of Mechanical Engineering Acquires skills to excel in the area of Mechanical Engineering both in Industries and Academics.
PEO3	Graduates of Mechanical Engineering Possess awareness towards Higher Education, R & D and Socio-Ethical values.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Graduates possess the knowledge to Design, Analyze and Develop Mechanical System
PSO2	Graduates are capable of developing research skills in Self Sustainable Energy Sources and Composite Materials.

PROGRAM OUTCOMES (PO)

PO 1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/ Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems	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.
PO 5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in Independent and life-long learning in the broadest context of technological change.

Visvesvaraya Technological University Belagavi

Academic Calendar for ODD Semester of 2018-2019 (Aug 2018 – Jan 2019)

	I Sem B.E/B.Tech/ B.Arch	III, V Sem B.E/B.Tech III, V VII, & IX Sem B.Arch	VII Sem B.E / B.Tech	III & V Sem MCA	III Sem MBA	III Sem M.Tech	III Sem M.Arch.
Commencement of ODD Semester	13.08.2018	01.08.2018	06.08.2018	01.08.2018	01.08.2018	01.08.2018 [Internship of 16 Weeks]	10.09.2018
Last Working day of ODD Semester	17.01.2019 [Includes 3 Weeks Induction Program]	30.11.2018	04.12.2018	30.11.2018	30.11.2018	30.11.2018	05.01.2019
Practical Examination	21.01.2019 To 30.01.2019	03.12.2018 To 14.12.2018	06.12.2018 To 14.12.2018	03.12.2018 To 07.12.2018			
Theory Examinations	04.02.2019 To 18.02.2019	17.12.2018 To 18.01.2019	17.12.2018 To 18.01.2019	10.12.2018 To 28.12.2018	05.12.2018 To 29.12.2018	05.12.2018 To 22.12.2018	09.01.2019 To 22.01.2019
Summer Project / Professional training					03.01.2019 To 16.02.2019 [Submission of report to VTU by 08.03.2019]		23.07.2018 To 07.09.2018 [Professional training]
Commencement of EVEN Semester	25.02.2019	01.02.2019	01.02.2019	01.02.2019	18.02.2019	28.12.2018	01.02.2019

NOTE.

- VII Semester B.E / B.Tech students shall have to undergo Internship for a period of four Weeks.
- I Semester B.E/ B.Tech / B.Arch Students shall compulsorily undergo Induction Program for a period of 3 Weeks as per the schedule given by VTU.

1. The faculty/staff shall be available to undertake any work assigned by the university.
2. If any of the above date is declared to be a holiday then the corresponding event will come into effect on the next working day.
3. Notification regarding Calendar of Events relating to the conduct of University Examination will be issued by the Registrar (Evaluation) from time to time.

REGISTRAR

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

DEPARTMENT CALENDER OF EVENTS

ACADEMIC YEAR 2018 – 19 [(ODD SEMESTER) AUG 2018 – JAN 2019].

Week (Session)	Mon	Tue	Wed	Thu	Fri	Sat	Sun	EVENTS	VTU Events Holidays
1ST	August 2018								
			1	2	3	4	5	1st HOD Meeting.	1st Commencement of Semester UG.
2ND	6	7	8	9	10	11	12	Submission of work load	
3RD	13	14	15	16	17	18	19	12th Commencement of P G (III Semester).	15th Independence Day
4TH	20	21	22	23	24	25	26	20th Parents meet	
5TH	27	28	29	30	31				
	September 2018								
						1	2		
6TH	3	4	5	6	7	8	9	3rd HOD Meeting.	
7TH	10	11	12	13	14	15	16	10th, 11th & 12th IA Test-I. 15th Engineers Day	13th Ganesh Chaturthi
8TH	17	18	19	20	21	22	23	17th Student Feedback. 19th SMS IA-1 Marks & Attendance to Parents. 22nd Performance Review of poor students.	21st Muharram
9TH	24	25	26	27	28	29	30		
10TH	October 2018								
	1	2	3	4	5	6	7		2nd Gandhi Jayanthi
11TH	8	9	10	11	12	13	14	9th HOD Meeting.	8th Mahalaya Amavasya
12TH	15	16	17	18	19	20	21	15h, 16th & 17th IA Test-II.	18th & 19th Vijayadashami
13TH	22	23	24	25	26	27	28	22nd SMS IA Marks & Attendance to Parents	24th Valmiki Jayanthi
14TH	29	30	31					29th Performance Review of poor students.	
	November 2018								
				1	2	3	4		1st Rajyotsava
15TH	5	6	7	8	9	10	11	10th HOD Meeting.	6th & 8th Deepavali
16TH	12	13	14	15	16	17	18	18th, 19th & 20th IA Test-III.	
17TH	19	20	21	22	23	24	25	24th SMS Final IA Marks & Attendance to parents.	21st Id-e-Milad
18TH	26	27	28	29	30			30th Course File Auditing 29th HOD Meeting.	26th Kanakadas Jayanthi. 30th last working day UG

3rd Dec – 14th Dec 2018 VTU **Practical** Examinations (B. E., III, V & VII Semesters).

17th Dec 2018 – 18th Jan 2019 VTU **Theory** Examinations (B. E., III, V & VII Semesters).

1st Aug 2018 Commencement of PG III Sem (Internship of 16 Weeks).

30th Nov 2018 Last Working Day PG III Sem.

5th Dec 2018 – 22th Dec 2018 VTU **Theory** Examinations (M. Tech, III Semester).

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

CLASS TIME-TABLE 2018-19(ODD SEM)

V V SANGHA'S
RAO BAHADUR Y MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY
ACADEMIC YEAR 2018-2019
DEPARTMENT OF MECHANICAL ENGINEERING
TIME TABLE

CLASS : 3RD SEM-A SECTION | W.E.F : 06 AUGUST 2018 | ROOM No. : LH-1

DAYS	09:00 AM to 09:55 AM	09:55 AM to 10:50 AM	10:50 AM to 11:00 AM	11:00 AM to 11:55 AM	11:55 AM to 12:50 PM	12:50 PM to 02:15 PM	02:15 PM to 03:10 PM	03:10 PM to 04:05 PM	04:05 PM to 05:00 PM
MONDAY	MOM	MAT-III	BREAK	MSMT	CAMD	LUNCH BREAK	MCW	BTD	BTD
TUESDAY	MSMT	MOM		MOM	MAT-III		CAMD(A3) / MSMT(A2) / F&F LAB(A1)		
WEDNESDAY	MAT-III	CAMD(A1) / MSMT(A3) / F&F LAB(A2)					MSMT	CAMD	
THURSDAY	CAMD	BTD	BREAK	MOM	MOM		MCW	MSMT	MAT-III(T)
FRIDAY	BTD	MCW		MAT-III	BTD		CAMD(A2) / MSMT(A1) / F&F LAB(A3)		
SATURDAY	MCW	MAT-III		BTD	MOM	TUTORIAL CLASS (MOM/BTD)	FREE		

BATCH LIST: A1 = ROLL No. 1-25, A2 = ROLL No. 26-50, A3 = ROLL No. 51-TILL END.

SL. No.	SUBJECT CODE	SUBJECT	STAFF
1	15MAT31	MATHS	SHIVAMMA
2	15ME32	MSMT	R H M SOMANATH SWAMY
3	15ME33	BTD	Dr S K Modi
4	15ME34	MOM	Dr Ikori Nagraj/Y Mallikarjun
5	15ME35A	MCW	M Balaji
6	15ME36A	CAMD	Vaddin Chetan
7	15MEL37A	MSMT LAB	R H M SOMANATH SWAMY/Virupaksha Gouda
8	15MEL38A	F&F LAB	M Balaji/B G Chandru
10	CLASS CO-ORDINATOR		Y. MALLIKARJUN

SL. No.	EVENTS	DATE
11	COMMENCEMENT OF 3rd SEM	
12	1ST IA TEST	
13	2ND IA TEST	
14	3RD IA TEST	
15	LAST WORKING DAY	
16	COMMENCEMENT OF PRACTICAL	
17	COMMENCEMENT OF THEORY EXAM	

CO-ORDINATOR

Head of the Department,
Mechanical Engineering Department,
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104.

PRINCIPAL/CHAIRMAN
R.Y.M. Engineering College
(Formerly Vijayanagar Institute of Technology)
Cantonment, Bellary-583 104

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

Material Science

Subject Code : 17ME32 | **CIE Marks : 40**
Hours/Week : 04 | **SEE Marks : 60**
Total Hours : 50 | **Exam Hours: 03**

Module – 1:

Basics, Mechanical Behavior, Failure of Materials

Introduction to Crystal Structure – Coordination number, atomic packing factor, Simple Cubic, BCC, FCC and HCP Structures, Crystal imperfections – point, line, surface and volume imperfections, Atomic Diffusion: Phenomenon, Fick's laws of diffusion;Factors affecting diffusion.

Mechanical Behavior:

Stress-strain diagrams showing ductile and brittle behavior of materials, Engineering and true strains, Linear and non-linear elastic behavior and properties, Mechanical properties in plastic range. Stiffness, Yield strength, Offset Yield strength, Ductility, Ultimate Tensile strength, Toughness, Plastic deformation of single crystal by slip and twinning, Mechanisms of strengthening in metals

Fracture: Type I, Type II and Type III,

Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, Fatigue properties, S-N diagram, Fatigue testing. Creep: Description of the phenomenon with examples, three stages of creep, creep properties, Stress relaxation. Concept of fracture toughness.

Module – 2:

Alloys, Steels, Solidification

Concept of formation of alloys: Types of alloys, solid solutions, factors affecting solid solubility (Hume Rothery rules), Binary phase diagrams: Eutectic, and Eutectoid systems, Lever rule, Substitutional and interstitial solid solutions, Intermediate phases, Gibbs phase rule Effect of non- equilibrium cooling, Coring and Homogenization Iron-Carbon (Cementite) diagram: description of phases, Specifications of steels. Solidification: Mechanism of solidification, Homogenous and Heterogeneous nucleation, Crystal growth, Numerical on lever rule.

Module – 3:

Heat Treatment, Ferrous and Non-Ferrous Alloys

Heat treating of metals: Time-Temperature-Transformation (TTT) curves, Continuous Cooling Transformation (CCT) curves, annealing: Recovery, Recrystallization and Grain growth, Types of annealing, Normalizing, Hardening, Tempering, Martempering, Austempering, Concept of hardenability, Factors affecting it hardenability, surface hardening methods: carburizing, cyaniding, nitriding, flame hardening and induction hardening, Age hardening of aluminum-copper alloys and PH steels. Ferrous materials: Properties, Compositions and uses of Grey cast iron, Malleable iron, SG iron and steel,

Module – 4:

Other Materials, Material Selection

Ceramics: Structure types and properties and applications of ceramics. Mechanical / Electrical behavior and processing of Ceramics. Plastics: Various types of polymers/plastics and their applications. Mechanical behaviors and processing of plastics, Failure of plastics. Other materials:Smart materials and Shape Memory alloys, properties and applications.

Module – 5:

Composite materials - Definition, classification, types of matrix materials & reinforcements, Metal Matrix Composites (MMCs), Ceramic Matrix Composites (CMCs) and Polymer Matrix Composites (PMCs), Particulate-reinforced and fiber-reinforced composites, Fundamentals of production of composites, Processes for production of composites, Constitutive relations of composites, Numerical problems on determining properties of composites.

TEXT BOOKS:

1. **Smith, Foundations of Materials Science and Engineering, 4th Edition, McGraw Hill, 2009.**
2. **William D. Callister, Material science and Engineering and Introduction, Wiley, 2006.**

REFERENCE BOOKS:

1. **V.Raghavan, Materials Science and Engineering, , PHI, 2002**
2. **Donald R. Askland and Pradeep.P. Phule, The Science and Engineering of Materials, Cengage Learning, 4lh Ed., 2003.**
3. **George Ellwood Dieter, Mechanical Metallurgy, McGraw-Hill.**
4. **ASM Handbooks, American Society of Metals.**

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

COURSE OUTCOMES 2018-19

Staff Name: R H M SOMANATH SWAMY	Sem: III	Sec: A
Course Name: MATERIAL SCIENCE	Course Code: 17ME32	Total Lecturer Hours: 50

CO Index	Course Outcome
At the end of the course completion student will be able to:	
17C202.1	Understand the mechanical properties of metals, their alloys and various modes of failure.
17C202.2	Describe the microstructures of ferrous and non-ferrous materials and their mechanical properties.
17C202.3	Interpret the processes of heat treatment of various alloys.
17C202.4	Discuss the properties, potentialities of various materials available and material selection procedures.
17C202.5	Explain about the composite materials, their processing and applications.

CO-PO mapping Matrix

PO's / CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
17C202.1	3	2	1	1`				2				2
17C202.2	3	3	1`	1				2				2
17C202.3	3	2	2	2		1	1	2				2
17C202.4	3	3	2	2		1	1	2				2
17C202.5	3	2	2	2		1	1	2				2
Average	3	2.4	1.75	1.75		1	1	2				2

COURSE COMMITTEE
CC
MECH
RYMEC

Justification for the CO with the PO (1-12)

PO1: All the contents of this subject are based on the knowledge of science, mathematics and fundamentals of engineering, therefore the entire CO's are mapped with high correlation 3.

PO2: Students apply the knowledge of engineering to formulate and analyze the problems. Hence CO2 and CO4 are mapped with high correlation 3, whereas CO1, CO3 and CO5 are mapped with correlation 2.

PO3: The students will be able to design and develop the solution for complex engineering problems. Therefore CO3, CO4 and CO5 are mapped with correlation 2 and remaining Co's are mapped with correlation 1.

PO4: Students are able to design and develop the mathematical solutions for various complex problems with the knowledge of material science. Therefore CO3, CO4 and CO5 are mapped with correlation 2 and remaining Co's are mapped with correlation 1.

PO5: Students are not going to use any modern tools for analyzing the complex problems of real life applications. Therefore none of the CO's is mapped.

PO6: Social and health issues can be addressed with the knowledge of material science hence CO3, CO4 and CO5 are mapped with correlation 1.

PO7: Environmental and sustainability can be addressed with the knowledge of material science hence CO3, CO4 and CO5 are mapped with correlation 1.

PO8: There is scope of in depth learning in the field of material science with ethics. Hence all CO's are mapped with correlation 2.

PO9: Team work is not addressed by any of the module. Therefore none of the CO's is mapped.

PO10: Communication is not addressed by any of the module. Therefore none of the CO's is mapped.

PO11: Project management and finance is not addressed by any one of the module. Therefore none of the CO's is mapped.

PO12: There is scope of in depth learning in the field of material science. Hence all CO's are mapped with correlation 2.

Justification for the CO with the PSO (1-2)

CO-PSO Mapping Matrix

PSO's / CO's	PSO1	PSO2
17C202.1	1	3
17C202.2	1	3
17C202.3	1	3
17C202.4	1	3
17C202.5	1	3
Average	1	3

***Note: - 1. Slight (Low) 2. Modarate (Medium) 3. Substanial (High).**

PSO1: Students are able to identify, design, analyze and develop mechanical elements satisfactorily. Hence all the CO's are mapped with PSO1 with correlation 1.

PSO2: With the knowledge of material science students are able to develop research skill in the field of composite materials. Hence all the CO's are mapped with PSO2 with correlation 3.

COURSE COMMITTEE
CC
MECH
RYMEC

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

STUDENTS LIST

Sl. No	USN	NAME	Sl.No	USN	NAME
A-1	3VC17ME001	AJAY REDDY N	A-39	3VC17ME054	PAVITHRA R
A-2	3VC17ME002	AKASHA GOUDA H	A-40	3VC16ME110	SUSHRUTH G BHAT
A-3	3VC17ME003	ANIL KITTUR	A-41	3VC18ME461	VISHWANATH GOWDA K
A-4	3VC17ME004	BHARATHISHA A B	A-42	3VC18ME454	THIPPESWAMY B
A-5	3VC17ME005	BHARGHAV R	A-43	3VC16ME100	SIRAJ AHAMED
A-6	3VC17ME006	C ESHWAR	A-44	3VC16ME007	ABHISHEK SINHA
A-7	3VC17ME007	DEEPAK PATIL S R	A-45	3VC18ME423	MADHUSUDHAN B
A-8	3VC17ME008	DODDA BASAVA B	A-46	3VC18ME441	SAGAR MP
A-9	3VC17ME009	DURJAYA K B	A-47	3VC18ME464	YESHWANTH D
A-10	3VC17ME010	EARESH VARMA C	A-48	3VC18ME405	K BHARATH KUMAR
A-11	3VC17ME011	EKNATH GHANTE	A-49	3VC18ME406	BOYA VENKATESH
A-12	3VC17ME012	ERANAGOUDA K M	A-50	3VC18ME433	NISAR AHAMED K M
A-13	3VC17ME013	G R RAJESH KUMAR	A-51	3VC18ME449	SHIVA SHANKAR ADUR
A-14	3VC17ME014	G RANJITH	A-52	3VC18ME420	KUMAR K
A-15	3VC17ME015	G RANJITH KUMAR	A-53	3VC18ME425	MANIKANTA K
A-16	3VC17ME016	G S SREE HARSHA	A-54	3VC18ME413	IMRAN ABDUL WAHEED BELGUMI
A-17	3VC17ME018	GANESH GOWDA M	A-55	3VC17ME081	VINAY KUMAR S
A-18	3VC17ME019	GANESH J	A-56	3VC18ME458	VINAY KUMAR K
A-19	3VC17ME020	GURUSIDDANA GOUDA B	A-57	3VC18ME457	V SIDDHI VINAYAKA
A-20	3VC17ME021	HAMPANNA	A-58	3VC18ME431	MULLA ALTAF HUSSAIN
A-21	3VC17ME022	HANUMESH	A-59	3VC18ME443	SAMPATH KUMAR Y M
A-22	3VC17ME023	JAFERSADIQ M ABDUL KHADER BASHA	A-60	3VC18ME434	G PAVAN KALYAN
A-23	3VC17ME024	JAGADEESH	A-61	3VC18ME410	H CHETHAN KUMAR
A-24	3VC17ME025	JEFFREY SUJAN KUMAR K	A-62	3VC18ME459	VINOD KUMAR B
A-25	3VC17ME026	K VINAY	A-63	3VC18ME462	VYSHNAVI
A-26	3VC17ME027	KADUBURU MATH PARIKSHITH	A-64	3VC18ME421	LAKSHMAN H
A-27	3VC17ME028	KAISARAHMED D	A-65	3VC18ME402	ANIL KUMAR V
A-28	3VC17ME029	KARTHIK KUMAR D	A-66	3VC18ME435	PAVITHRA K
A-29	3VC17ME030	KARTHIK R B	A-67	3VC18ME411	H M UDAY KUMAR
A-30	3VC17ME031	KIRAN MATH	A-68	3VC18ME424	MAHANTESH H M
A-31	3VC17ME032	LOKESHA NAIK	A-69	3VC18ME415	K VINAY KUMAR
A-32	3VC17ME033	M CHAITANYA	A-70	3VC18ME418	KIRAN KUMAR D
A-33	3VC17ME040	MD NOOR AHMED	A-71	3VC18ME446	K SHIVA KUMAR
A-34	3VC17ME041	MOHAMMED AZAM J	A-72	3VC18ME401	ANAND K R
A-35	3VC17ME043	MOHAN E	A-73	3VC18ME455	THIPPESWAMY R
A-36	3VC17ME046	NAVEEN SURAGOUNI	A-74	3VC18ME460	VISHWANATH H
A-37	3VC17ME049	PAVAN KUMAR B	A-75	3VC18ME444	SANTOSH G
A-38	3VC18ME429	MD IRSHAD J			

Head of the Department,
Mechanical Engineering Department
R.Y.M. Engineering Collage,
Cantonment, BELLARY-583 104

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

COURSE PLAN 2018-19 (ODD Sem)

Staff Name: Prof. R H M Somanath Swamy	**Course Type:** Core	**Sem / Sec:** 3rd / A
Course Name: Material Science	**Course Code:** 17ME32	**Total No. of Lecture Hours:** 50
Max marks: 100	**Prerequisites:** This subject requires the basic knowledge of Mechanics, Mathematics, Physics & Chemistry.	

Sl. No.	Module Name	Hours Required	Assessment Strategy
01	Basics, Mechanical Behavior, Failure of Materials	10 Hrs	CIE , SEE
02	Alloys, Steels, Solidification	10 Hrs	CIE , SEE
03	Heat Treatment, Ferrous and Non-Ferrous Alloys	10 Hrs	CIE , SEE
04	Other Materials, Material Selection	10 Hrs	CIE , SEE
05	posite materials	10 Hrs	CIE , SEE

Assessment Strategy:

Assignment	CIE	SEE	Seminar
Mention if any other required:			

Teaching and Learning Tools: Blackboard/PowerPoint presentation.

TEXT BOOKS:

1. Smith, Foundations of Materials Science and Engineering, 4th Edition, McGraw Hill, 2009.
2. William D. Callister, Material science and Engineering and Introduction, Wiley, 2006.

REFERENCE BOOKS:

1. V.Raghavan, Materials Science and Engineering, , PHI, 2002
2. Donald R. Askland and Pradeep.P. Phule, The Science and Engineering of Materials, Cengage Learning, 4lh Ed., 2003.
3. George Ellwood Dieter, Mechanical Metallurgy, McGraw-Hill.
4. ASM Handbooks, American Society of Metals.

Digital Library:

1. **\\192.168.8.4\gdlc1\Mechanical Reference Books**
2. **\\192.168.8.4\gdlc1\EngineeringLibrary-1**

Contents beyond Syllabus:

1. **Discussion about nano materials and its application.**
2. **Research on Composite materials and its manufacturing techniques.**

Staff Signature

HOD

Head of the Department,
Mechanical Engineering Department,
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104

COURSE COMMITTEE
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RYMEC

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

COURSE EXECUTION SUMMARY 2018-19

Staff Name: Prof. R H M Somanath Swamy	**Course Type: Core**	**Sem / Sec: 3rd / A**
Course Name: Material Science	**Course Code: 17ME32**	**Total No. of Lecture Hours: 50**
Max marks: 100	**Prerequisites:** This subject requires the basic knowledge of Mechanics, Mathematics, Physics & Chemistry.	

Sl. No.	Date	Time/Period	Topic covered
01	6/8/18	1hr	Introduction to Crystal Structure, Coordination number and Atomic Packing Factor.
02	7/8/18	1hr	Crystal imperfections – point, line, surface and volume imperfections
03	8/8/18	1hr	Atomic Diffusion, Fick's laws of diffusion; Factors affecting diffusion
04	9/8/18	1hr	Stress-strain diagrams showing ductile and brittle behavior of materials, Engineering and true strains, Linear and non-linear elastic behavior and properties.
05	14/8/18	1hr	Mechanical properties in plastic range. Stiffness, Yield strength, Offset Yield strength, Ductility, Ultimate Tensile strength, Toughness.
06	16/8/18	1hr	Problems
07	20/8/18	1hr	Plastic deformation of single crystal by slip and twinning, Mechanisms of strengthening in metals.
08	20/8/18	1hr	Fracture: Type I, Type II and Type III.
09	22/8/18	1hr	Types of fatigue loading with examples, Mechanism of fatigue, Fatigue properties, S-N diagram, Fatigue testing.
10	23/8/18	1hr	Creep: Description of the phenomenon with examples, three stages of creep, creep properties, Stress relaxation. Concept of fracture toughness
11	27/8/18	1hr	Concept of formation of alloys: Types of alloys, solid solutions
12	28/8/18	1hr	factors affecting solid solubility (Hume Rothery rules)
13	29/8/18	1hr	Binary phase diagrams: Eutectic, and Eutectoid systems
14	30/8/18	1hr	Lever rule, Substitutional and interstitial solid solutions
15	3/9/18	1hr	Intermediate phases, Gibbs phase rule Effect of non- equilibrium cooling,
16	4/9/18	1hr	Coring and Homogenization Iron-Carbon (Cementite) diagram: description of phases
17	4/9/18	1hr	Specifications of steels
18	5/9/18	1hr	Solidification: Mechanism of solidification, Homogenous and Heterogeneous nucleation, Crystal growth,
19	6/9/18	1hr	Numerical on lever rule
20	10/9/18	1hr	Numerical on lever rule
21	11/9/18	1hr	Heat treating of metals: Time-Temperature-Transformation (TTT) curves
22	12/9/18	1hr	Continuous Cooling Transformation (CCT) curves
23	13/9/18	1hr	Annealing: Recovery, Recrystallization and Grain growth
24	17/9/18	1hr	Types of annealing
25	18/9/18	1hr	Normalizing, Hardening
26	19/9/18	1hr	Tempering, Martempering, Austempering.
27	20/9/18	1hr	Concept of hardenability, Factors affecting it hardenability.
28	24/9/18	1hr	Surface hardening methods: carburizing, cyaniding, nitriding, flame hardening and induction hardening.
29	25/9/18	1hr	Age hardening of aluminum-copper alloys and PH steels.
30	26/9/18	1hr	Ferrous materials: Properties, Compositions and uses of grey cast iron, Malleable iron, SG iron and steel.
31	27/9/18	1hr	Ceramics: Structure types and properties
32	1/10/18	1hr	Applications of ceramics
33	3/10/18	1hr	Mechanical / Electrical behavior of Ceramics
34	4/10/18	1hr	Processing of Ceramics
35	4/10/18	1hr	Plastics: Various types of polymers/plastics and their applications.
36	9/10/18	1hr	Mechanical behavior of plastics

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Department of Mechanical Engineering

Sl. No.	Date	Time/Period	Topic covered
37	10/10/18	1hr	Processing of plastics
38	11/10/18	1hr	Failure of plastics.
39	22/10/18	1hr	Smart materials properties and applications.
40	23/10/18	1hr	Shape Memory alloys properties and applications.
41	23/10/18	1hr	Composite materials - Definition, classification
42	25/10/18	1hr	Types of matrix materials & reinforcements
43	26/10/18	1hr	Metal Matrix Composites (MMCs), Ceramic Matrix Composites (CMCs)
44	29/10/18	1hr	Polymer Matrix Composites (PMCs)
45	30/10/18	1hr	Particulate-reinforced and fiber-reinforced composites
46	31/10/18	1hr	Fundamentals of production of composites
47	12/11/18	1hr	Processes for production of composites
48	13/11/18	1hr	Constitutive relations of composites
49	14/11/18	1hr	Numerical problems on determining properties of composites.
50	15/11/18	1hr	Numerical problems on determining properties of composites.
51	22/11/18	1hr	Tutorial Class
52	23/11/18	1hr	Tutorial Class
53	27/11/18	1hr	Tutorial Class
54	28/11/18	1hr	Tutorial Class

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COURSE EVALUATION AND ASSESSMENT SCHEME (2018-19)

	What		To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected
Direct Assessment Methods	CIE	Continuous Internal Evaluation	Students	Thrice (Average of the best two will be computed)	30	Blue Books
		Assignment		One(During Semester)	10	Assignment Books
		Practical Assessment		-	-	-
	SEE	Semester Final Examination		End of Course (Answering One of two questions from five Modules)	60	Result sheet
		Practical Examination		-	-	-
Indirect Assessment Methods	Students Feedback		Students	End of the course	-	Questionnaire
	Course Exit Survey					

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy)

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Department of Mechanical Engineering

ASSIGNMENT -I (2018-19 Odd Sem)

QUESTIONS	BTL	CO	PO
1. Define atomic packing factor. Calculate the coordination number, atomic radius and atomic packing factor for BCC unit cell.	L2		
2. Classify and explain the crystal defects or crystal imperfections.	L2		
3. List out the difference between edge dislocation and screw dislocation. Differentiate between slip and twinning with neat sketches.	L2		
4. State and Explain Fick's laws of Diffusion.	L2		
5. List and explain the factors affecting diffusion.	L2		
6. Draw stress-strain curve for ductile and brittle materials. Explain their salient points.	L3		
7. Define true stress and true strain. How is it different from engineering stress and engineering strain?	L2	17C202.1	1,2,3,4 ,8,12
8. Define and classify fracture. Explain with neat sketch cup and cone fracture.	L2		
9. Obtain an expression for CRSS.	L3		
10. Define fatigue and explain S-N curve for mild steel and aluminium alloys.	L3		
11. Explain the different types of stress cycles that cause fatigue failure, with neat sketches.	L3		
12. With neat sketch explain the stages of fatigue failure.	L3		
13. Draw creep curve and explain different stages of creep.	L3		
14. What is stress relaxation? Derive an expression for stress relaxation.	L3		

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Department of Mechanical Engineering

CONTINUOUS INTERNAL EVALUATION-I (2018-19 Odd Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec
Date: 15.09.2018	Time: 12.30 to 01.45 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1	Define atomic packing factor. Calculate the coordination number, atomic radius and the atomic packing factor for BCC unit cell. **-OR-** Q2 Classify crystal imperfections and explain Line imperfections.	06	L2	17C202.1	1,2,3,4 ,8,12
Q3	A 12.5 mm dia Aluminium alloy test bar is subjected to load of 2 tons. If the dia of the bar is 12.4 mm at this load, calculate engineering strain, engineering sress, true stress and true strain. Assume no change in volume. **-OR-** Q4 A 0.2% C steel component is to be carburized at 920^0C. Calculate the time required to increase the carbon content to 0.4% at 0.5 mm below the surface. Assume that the carbon content at the surface is 0.9%. Given $D_{920^oC} = 1.28 \times 10^{-11} m^2/s$. Z | erf(Z) 0.75 | 0.7112 Z | 0.7142 0.80 | 0.7421	06	L3	17C202.1	1,2,3,4 ,8,12
Q5	Draw stress-strain curve for ductile and brittle materials. Explain their salient points. **-OR-** Q6 State and Explain Fick's laws of Diffusion.	06	L3	17C202.1	1,2,3,4 ,8,12
Q7	Define and classify fracture. Explain with neat sketch cup and cone fracture. **-OR-** Q8 Define fatigue and explain S-N curve for mild steel and aluminium alloy.	06	L3	17C202.1	1,2,3,4 ,8,12
Q9	Draw creep curve and explain different stages of creep. **-OR-** Q10 What is stress relaxation? Derive an expression for stress relaxation.	06	L3	17C202.1	1,2,3,4 ,8,12

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

Staff **QP Coordinator** **Course Coordinator** **HOD**

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Department of Mechanical Engineering

SCHEME OF EVALUATION FOR CIE-I (2018-19 Odd Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec & B-sec
Date: 15.09.2018	Time: 12.30 to 01.45 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1	Define atomic packing factor ----------1 mark Coordination number ----------1 mark Atomic radius ----------2 marks Atomic packing factor ----------2 marks -OR- Q2 Classification of crystal imperfections ----3 marks Explanation of Line imperfections. --------3 marks	06	L2	17C202.1	1,2,3,4 ,8,12
Q3	Given data ----------1 mark Equation ----------1 mark Calculation ----------3 marks Result ----------1 mark -OR- Q4 Given data ----------1 mark Equation ----------1 mark Calculation ----------3 marks Result ----------1 mark	06	L3	17C202.1	1,2,3,4 ,8,12
Q5	Stress-strain curve for ductile material -------- 3 marks Stress-strain curve for brittle materials -------- 3 marks -OR- Q6 Statement of Fick's laws of Diffusion --------- 2 marks Explanation ---------- 4 marks	06	L3	17C202.1	1,2,3,4 ,8,12
Q7	Definition of fracture ---------- 1 mark Classification of fracture ---------- 2 marks Sketch of cup and cone fracture ------ 3 marks -OR- Q8 Definition of fatigue ---------- 1 mark S-N curve for mild steel ---------- 2.5 marks S-N curve for aluminium alloy ------ 2.5 marks	06	L3	17C202.1	1,2,3,4 ,8,12
Q9	Creep curve ---------- 2 marks Different stages of creep ---------- 4 marks -OR- Q10 Stress relaxation ---------- 2 marks Derivation for stress relaxation ------ 4 marks	06	L3	17C202.1	1,2,3,4 ,8,12

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

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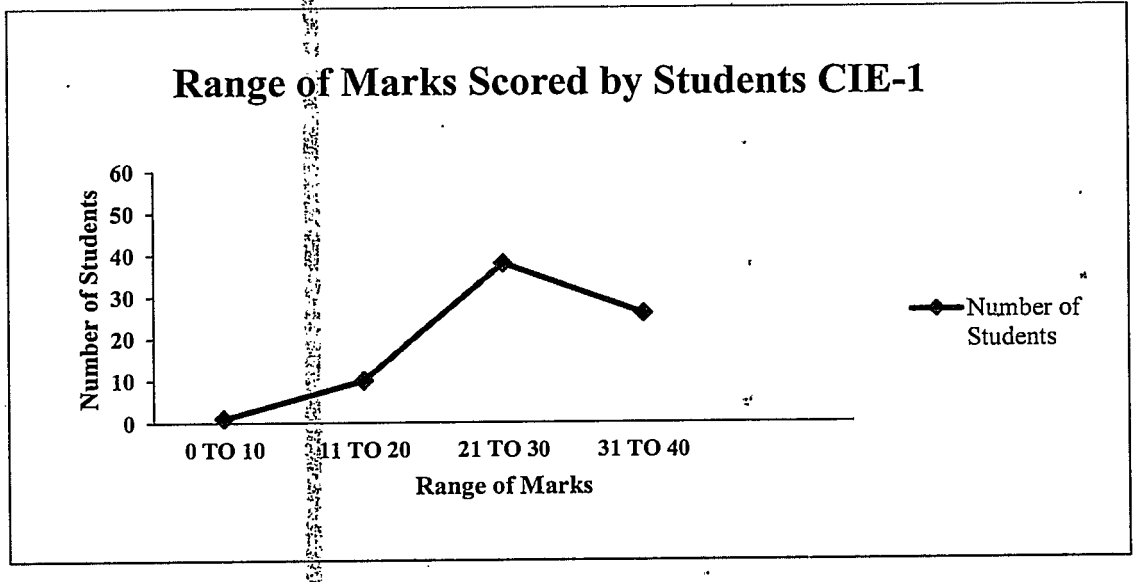
Department of Mechanical Engineering

CIE-I PERFORMANCE ANALYSIS

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CO mapping	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1	17C202.1
Max Marks /Question	6	6	6	6	6	6	6	6	6	6
Total marks of class /question	296	34	66	118	126	196	164	56	165	116
No. of students attended	64	9	28	31	33	39	36	22	43	22
No of students scored > 60% of marks/Question	53	6	9	19	18	33	29	7	29	20
Percentage of students scored > 60% of marks/Question	83	67	32	61	55	85	81	32	67	91

Mark range	0 TO 10	11 TO 20	21 TO 30	31 TO 40
No. Of Students	1	10	38	26



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ASSIGNMENT -II (2018-19 Odd Sem)

QUESTIONS	BTL	CO	PO
1. Define ceramic materials and explain its classification.	L2	17C202.4	1,2,3,4, 6,7,8,12
2. Explain any one method of processing of ceramic material.	L2		
3. State and explain the mechanical and electrical properties of ceramic materials.	L2		
4. How plastics are classified based on structure and behaviour? Give the advantages and disadvantages of plastic materials.	L2		
5. Differentiate between Thermo setting and Thermoplastic polymers.	L2		
6. With a neat sketch explain the processing of plastic by Compression moulding method.	L3		
7. What are smart materials? Write short notes on Piezo electric materials and shape memory alloys.	L2		
8. Define smart material. Explain briefly the types of smart materials.	L2		
9. Define composite material. Explain the role of matrix, interface and reinforcement in a composite material.	L2	17C202.5	1,2,3,4, 6,7,8,12
10. Explain in detail the classification of composite materials.	L2		
11. List the advantages, disadvantages and applications of composites.	L2		
12. Explain Resin transfer moulding process, with a neat sketch. State its advantages and disadvantages.	L3		
13. Under iso - strain condition, derive an expression for Young's modulus of fibre reinforced composites.	L3		
14. Under iso - stress condition, derive an expression for Young's modulus of a fibre reinforced composites..	L3		
15. With a neat sketch explain injection moulding process and state its advantages.	L3		
16. With a neat sketch explain pultrusion process. List its advantages, disadvantages and applications.	L3		
17. With a neat sketch explain hand layup process. List its advantages, disadvantages and applications.	L3		
18. With a neat sketch, explain filament winding process. List its advantages, disadvantages and applications.	L3		

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Department of Mechanical Engineering

CONTINUOUS INTERNAL EVALUATION- II (2018-19 Odd Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec & B-sec
Date: 15.10.2018	Time: 03.45 to 05.00 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1	Define ceramic materials and explain its classification. **-OR-** Q2 State and explain the mechanical and electrical properties of ceramic materials.	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q3	How plastics are classified? Give the advantages and disadvantages of plastic materials. **-OR-** Q4 Explain Resin transfer moulding process, with a neat sketch. State its advantages and disadvantages.	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q5	What are smart materials? Write short notes on Piezo electric materials and shape memory alloys. **-OR-** Q6 Define smart material. Explain briefly the types of smart materials.	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q7	List the advantages, disadvantages and applications of composites. **-OR-** Q8 With a neat sketch explain pultrusion process. List its advantages, disadvantages and applications.	06	L2	17C202.5	1,2,3,4, 6,7,8,12
Q9	Under iso - strain condition, derive an expression for Young's modulus of fibre reinforced composites. **-OR-** Q10 A composite material is made by using 10% by volume of Kevlar fiber and 90% epoxy matrix. If the elastic modulus of Kevlar is 130GN/m^2 and epoxy is 4GN/m^2. Calculate 19. Young's modulus of composite material in fiber direction. 20. Young's modulus of composite material in transverse direction. 21. Fraction load carried by the fiber.	06	L3	17C202.5	1,2,3,4, 6,7,8,12

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

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Department of Mechanical Engineering

SCHEME OF EVALUATION FOR CIE-II (2018-19 ODD Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec & B-sec
Date: 15.10.2018	Time: 03.45 to 05.00 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1 Q2	Definition ceramic materials ------ 2 mark Classification ---------- 4 marks **-OR-** Mechanical properties of ceramic materials ---- 3 marks Electrical properties of ceramic materials ------- 3 marks	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q3 Q4	Classification of plastics ---------- 2 marks Advantages of plastic materials ---------- 2 marks Disadvantages of plastic materials -------- 2 marks **-OR-** Sketch of Resin transfer moulding process ------- 2 marks Advantages of Resin transfer moulding ---------- 2 marks Disadvantages of Resin transfer moulding -------- 2 marks	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q5 Q6	Explanation about smart materials ---------- 2 marks Short notes on Piezo electric materials ------ 2 marks Short notes on shape memory alloys --------- 2 marks **-OR-** Definition of smart material --------- 2 marks Types of smart materials ---------- 4 marks	06	L2	17C202.4	1,2,3,4, 6,7,8,12
Q7 Q8	Advantages of composites ---------- 2 marks Disadvantages of composites ------- 2 marks Applications of composites --------- 2 marks **-OR-** Pultrusion process sketch ---------- 1.5 marks Explanation ---------- 1.5 marks Advantages, disadvantages and applications ------- 3 marks	06	L2	17C202.5	1,2,3,4, 6,7,8,12
Q9 Q10	derivation for Young's modulus of fibre reinforced composites. ---------- 6 marks **-OR-** Given data ----------1 mark Equation ----------1 mark Calculation ----------3 marks Result ----------1 mark	06	L3	17C202.5	1,2,3,4, 6,7,8,12

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

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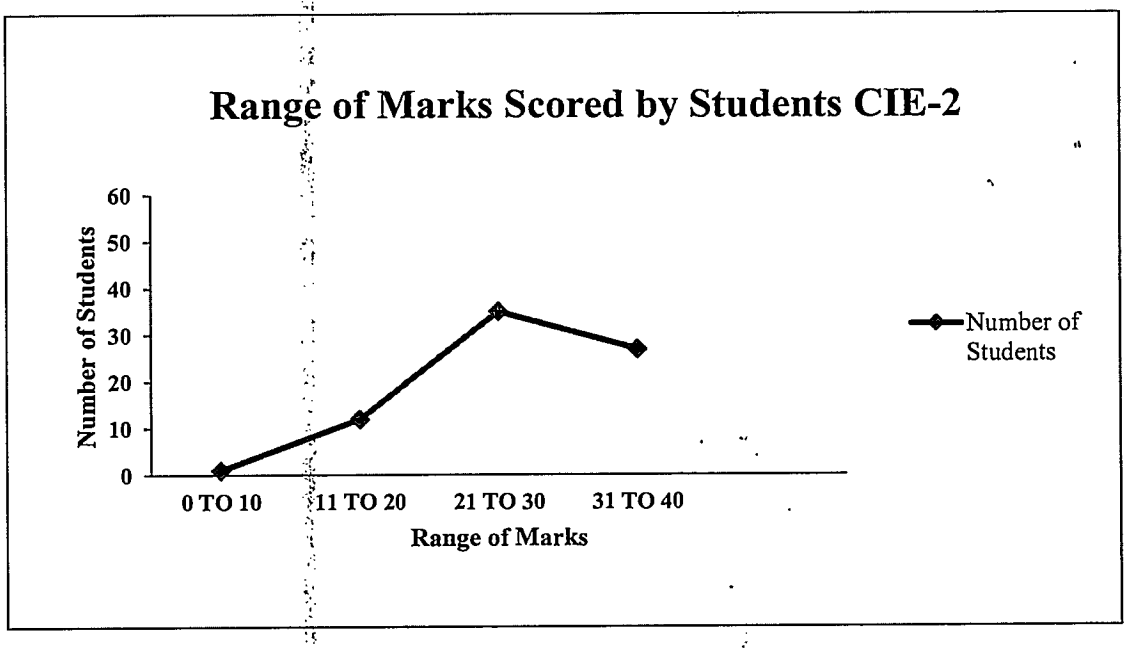
CIE-II PERFORMANCE ANALYSIS

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CO mapping	17C202.4	17C202.4	17C202.4	17C202.4	17C202.4	17C202.4	17C202.5	17C202.5	17C202.5	17C202.5
Max Marks /Question	6	6	6	6	6	6	6	6	6	6
Total marks of class /question	195	100	214	33	149	29	56	219	248	52
No. of students attended	45	24	55	7	39	10	14	45	51	12
No of students scored > 60% of marks/Question	33	18	36	6	21	5	10	40	40	8
Percentage of students scored > 60% of marks/Question	73	75	65	86	54	50	71	89	78	67

Mark range	0 TO 10	11 TO 20	21 TO 30	31 TO 40
No. Of Students	1	12	35	27



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Department of Mechanical Engineering

ASSIGNMENT -III (2018-19 Odd Sem)

QUESTIONS	BTL	CO	PO
1. What is Solid Solution? Explain types of Solid Solution.	L2	17C202.2	1,2,3, 4,8,12
2. Explain the Hume Rothery rules for the formation of substitutional solid solution.	L2		
3. Write a note on Coring and Homogenization.	L2		
4. State and explain Gibb's phase rule.	L2		
5. With neat sketch explain the construction of phase diagrams.	L3		
6. Two metals A and B with melting temperature 850°C and 1100°C respectively having unlimited liquid solubility. They form eutectic solid solution at 600°C at composition of 35% A and 65% B. The maximum solid solubility of A in B is 10% at eutectic temperature and 5% at room temperature. The maximum solubility of B in A is 16% at eutectic temperature and 7% at Room temperature. Assume liquidus solidus and solvus lines to be straight. a) Draw the phase diagrams and label all the regions. b) Determine number, relative amount of phase at room temperature for an alloy of 60%A and 40%B.	L3		
7. Draw the Iron Carbon Equilibrium diagram and label all the regions. Explain the invariant reactions.	L3	17C202.3	1,2,3,4, 6,7,8,12
8. Write a note on AISI designation of steel and BIS designation of steel.	L2		
9. What is meant by homogeneous nucleation? Derive an expression for critical radius required for homogeneous nucleation with free energy curve.	L3		
10. Write a short note on Solidification of Alloys.	L2		
11. Draw the TTT diagram for eutectoid steel. Super impose cooling curves on the diagram and explain various transformed product of austenite on cooling.	L3		
12. Explain Flame hardening with sketch.	L3		
13. Explain composition, properties and uses of Grey cast iron, white cast iron, malleable iron and SG iron.	L2		
14. Differentiate between Austempering and Martempering.	L2		
15. Differentiate between Annealing and Normalizing.	L2		
16. Explain Age hardening.	L2		
17. Define the process of heat treatment and classify the various heat treatment processes.	L2		
18. With neat sketch explain Jominy hardenability test.	L3		

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Department of Mechanical Engineering

CONTINUOUS INTERNAL EVALUATION-III (2018-19 Odd Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec & B-sec
Date: 27.11.2018	Time: 03.45 to 05.00 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1	Explain the factors given by Hume Rothery rules governing the formation of substitution solid solution.	06	L2	17C202.2	1,2,3, 4,8,12
	-OR-				
Q2	State and explain Gibbs face rule.				
Q3	Two metals A and B with melting temperature 850°C and 1100°C respectively having unlimited liquid solubility. They form eutectic solid solution at 600°C at composition of 35% A and 65% B. The maximum solid solubility of A in B is 10% at eutectic temperature and 5% at room temperature. The maximum solubility of B in A is 16% at eutectic temperature and 7% at Room temperature. Assume liquidus solidus and solvus lines to be straight. a) Draw the phase diagrams and label all the regions. b) Determine number, relative amount of phase at room temperature for an alloy of 60%A and 40%B.	06	L3	17C202.2	1,2,3, 4,8,12
Q4	-OR- Draw the Iron Carbon Equilibrium diagram and label all the regions. Explain the invariant reactions.				
Q5	Write a note on AISI designation of steel and BIS designation of steel.	06	L3	17C202.2	1,2,3, 4,8,12
	-OR-				
Q6	What is meant by homogeneous nucleation? Derive an expression for critical radius required for homogeneous nucleation with free energy curve.				
Q7	Draw the TTT diagram for eutectoid steel. Super impose cooling curves on the diagram and explain various transformed product of austenite on cooling	06	L3	17C202.3	1,2,3,4, 6,7,8,12
	-OR-				
Q8	Explain Flame hardening with sketch.				
Q9	Explain composition, properties and uses of Grey cast iron, white cast iron, malleable iron and SG iron.	06	L2	17C202.3	1,2,3,4, 6,7,8,12
	-OR-				
Q10	Define the process of heat treatment and classify the various heat treatment processes.				

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

Staff QP Coordinator Course Coordinator HOD

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Department of Mechanical Engineering

SCHEME OF EVALUATION FOR CIE-III (2018-19 Odd Sem)

Course: MATERIAL SCIENCE	Course Code: 17ME32	Sem: 3rd / A-sec & B-sec
Date: 27.11.2018	Time: 03.45 to 05.00 PM	Max marks: 30
Course offered by : R H M SOMANATH SWAMY & ACHUTANANDA K B		

Q No	QUESTIONS	Marks	BTL	CO	PO
Q1 Q2	The factors given by Hume-Rothery rules governing the formation of substitution solid solution. --- 6 marks **-OR-** Statement of explain Gibbs face rule. ----- 1 mark Explanation ---------- 5 marks	06	L2	17C202.2	1,2,3, 4,8,12
Q3 Q4	Given data ----------1 mark Equation ----------1 mark Calculation ----------3 marks Result ----------1 mark **-OR-** Iron Carbon Equilibrium diagram ------- 3 marks Explanation of invariant reactions ------- 3 marks	06	L3	17C202.2	1,2,3, 4,8,12
Q5 Q6	AISI designation of steel ------- 3 marks BIS designation of steel -------- 3 marks **-OR-** Homogeneous nucleation definition ----- 1 mark Derivation for critical radius ---------- 5 marks	06	L3	17C202.2	1,2,3, 4,8,12
Q7 Q8	TTT diagram for eutectoid steel ------- 2 marks Super impose cooling curves on the diagram ------- 2 marks Explanation various transformed product of austenite on cooling ------- 2 marks **-OR-** Flame hardening sketch ------- 3 marks Explanation ------- 3 marks	06	L3	17C202.3	1,2,3,4, 6,7,8,12
Q9 Q10	Grey cast iron composition, properties and uses -- 1.5 marks White cast iron composition, properties and uses--1.5 marks Malleable iron composition, properties and uses -- 1.5 marks SG iron composition, properties and uses -- 1.5 marks **-OR-** Process of heat treatment ------ 2 marks Classification of various heat treatment processes -- 4 marks	06	L2	17C202.3	1,2,3,4, 6,7,8,12

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome)

Staff QP Coordinator Course Coordinator HOD

IAQC MECH RYMEC

COURSE COMMITTEE MECH RYMEC

Head of the Department.
Mechanical Engineering Departm
R.Y.M. Engineering Collage
BELLARY-583 1

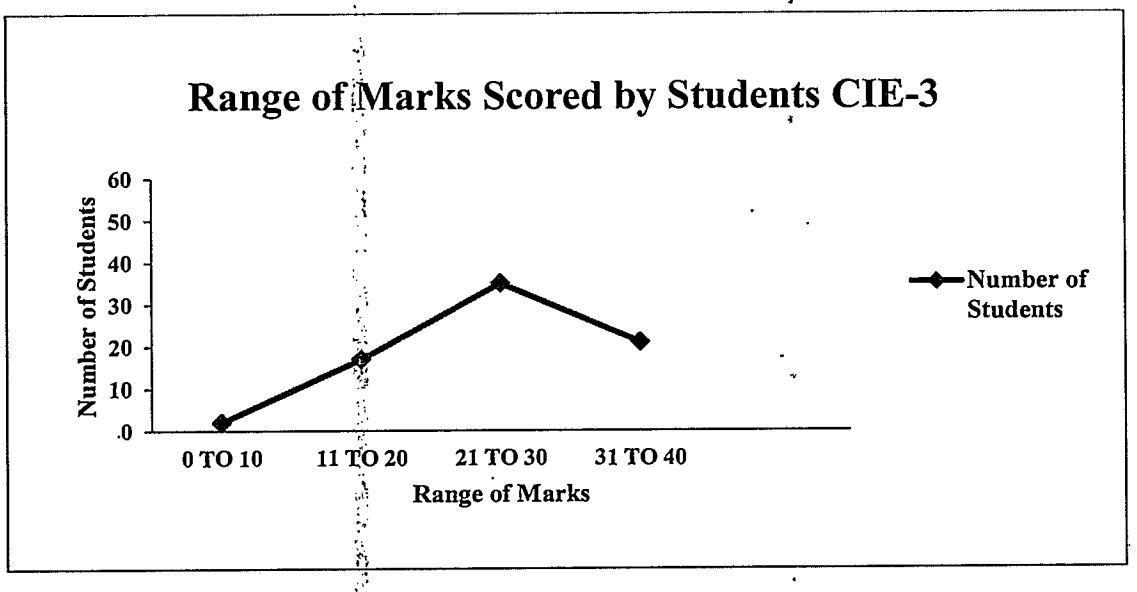
RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

CIE-III PERFORMANCE ANALYSIS

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CO mapping	17C202.2	17C202.2	17C202.2	17C202.2	17C202.2	17C202.2	17C202.3	17C202.3	17C202.3	17C202.3
Max Marks /Question	6	6	6	6	6	6	6	6	6	6
Total marks of class /question	121	132	79	135	73	147	92	111	115	87
No. of students attended	30	31	21	41	16	36	21	26	31	23
No of students scored > 60% of marks/Question	22	24	16	21	12	28	18	20	21	14
Percentage of students scored > 60% of marks/Question	73	77	76	51	75	78	86	77	68	61

Mark range	0 TO 10	11 TO 20	21 TO 30	31 TO 40
No. Of Students	2	17	35	21



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

TUTORIAL CLASSES INFORMATION

Sl. No	Topic Covered
01	Numerical on lever rule
02	Problems on mechanical properties
03	Numerical problems on determining properties of composites

Staff

HOD

Head of the Department,
Mechanical Engineering Department
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

FINAL CIE AND SEE MARKS

R. No.	USN	NAME	CIE	SEE	R. No.	USN	NAME	CIE	SEE
A-1	3VC17ME001	AJAY REDDY N	36	48	A-39	3VC17ME054	PAVITHRA R	38	50
A-2	3VC17ME002	AKASHA GOUDA H	38	48	A-40	3VC16ME110	SUSHRUTH G BHAT	35	40
A-3	3VC17ME003	ANIL KITTUR	37	47	A-41	3VC18ME461	VISHWANATH GOWDA K	32	48
A-4	3VC17ME004	BHARATHISHA A B	36	32	A-42	3VC18ME454	THIPPESWAMY B	35	45
A-5	3VC17ME005	BHARGHAV R	36	35	A-43	3VC16ME100	SIRAJ AHAMED	32	39
A-6	3VC17ME006	C ESHWAR	32	45	A-44	3VC16ME007	ABHISHEK SINHA	35	30
A-7	3VC17ME007	DEEPAK PATIL S R	35	49	A-45	3VC18ME423	MADHUSUDHAN B	35	52
A-8	3VC17ME008	DODDA BASAVA B	38	51	A-46	3VC18ME441	SAGAR MP	37	51
A-9	3VC17ME009	DURJAYA K B	35	52	A-47	3VC18ME464	YESHWANTH D	30	36
A-10	3VC17ME010	EARESH VARMA C	36	45	A-48	3VC18ME405	K BHARATH KUMAR	35	51
A-11	3VC17ME011	EKNATH GHANTE	35	44	A-49	3VC18ME406	BOYA VENKATESH	35	0
A-12	3VC17ME012	ERANAGOUDA K M	37	42	A-50	3VC18ME433	NISAR AHAMED K M	35	51
A-13	3VC17ME013	G R RAJESH KUMAR	34	48	A-51	3VC18ME449	SHIVA SHANKAR ADUR	35	36
A-14	3VC17ME014	G RANJITH	37	42	A-52	3VC18ME420	KUMAR K	35	52
A-15	3VC17ME015	G RANJITH KUMAR	35	42	A-53	3VC18ME425	MANIKANTA K	35	42
A-16	3VC17ME016	G S SREE HARSHA	37	46	A-54	3VC18ME413	IMRAN ABDUL WAHEED BELGUMI	36	57
A-17	3VC17ME018	GANESH GOWDA M	37	51	A-55	3VC17ME081	VINAY KUMAR S	34	51
A-18	3VC17ME019	GANESH J	37	47	A-56	3VC18ME458	VINAY KUMAR K	35	45
A-19	3VC17ME020	GURUSIDDANA GOUDA B	37	48	A-57	3VC18ME457	V SIDDHI VINAYAKA	35	54
A-20	3VC17ME021	HAMPANNA	37	48	A-58	3VC18ME431	MULLA ALTAF HUSSAIN	35	48
A-21	3VC17ME022	HANUMESH	35	48	A-59	3VC18ME443	SAMPATH KUMAR Y M	36	36
A-22	3VC17ME023	JAFERSADIQ M ABDUL KHADER BASHA	37	45	A-60	3VC18ME434	G PAVAN KALYAN	35	42
A-23	3VC17ME024	JAGADEESH	35	52	A-61	3VC18ME410	H CHETHAN KUMAR	28	49
A-24	3VC17ME025	JEFFREY SUJAN KUMAR K	36	50	A-62	3VC18ME459	VINOD KUMAR B	32	51
A-25	3VC17ME026	K VINAY	36	50	A-63	3VC18ME462	VYSHNAVI	35	51
A-26	3VC17ME027	KADUBURU MATH PARIKSHITH	35	48	A-64	3VC18ME421	LAKSHMAN H	30	42
A-27	3VC17ME028	KAISARAHMED D	37	51	A-65	3VC18ME402	ANIL KUMAR V	35	48
A-28	3VC17ME029	KARTHIK KUMAR D	35	48	A-66	3VC18ME435	PAVITHRA K	36	45
A-29	3VC17ME030	KARTHIK R B	38	44	A-67	3VC18ME411	H M UDAY KUMAR	33	50
A-30	3VC17ME031	KIRAN MATH	37	51	A-68	3VC18ME424	MAHANTESH H M	36	54
A-31	3VC17ME032	LOKESHA NAIK	38	50	A-69	3VC18ME415	K VINAY KUMAR	35	53
A-32	3VC17ME033	M CHAITANYA	37	53	A-70	3VC18ME418	KIRAN KUMAR D	34	56
A-33	3VC17ME040	MD NOOR AHMED	35	45	A-71	3VC18ME446	K SHIVA KUMAR	35	45
A-34	3VC17ME041	MOHAMMED AZAM J	35	49	A-72	3VC18ME401	ANAND K R	35	56
A-35	3VC17ME043	MOHAN E	35	48	A-73	3VC18ME455	THIPPESWAMY R	30	42
A-36	3VC17ME046	NAVEEN SURAGOUNI	35	46	A-74	3VC18ME460	VISHWANATH H	34	45
A-37	3VC17ME049	PAVAN KUMAR B	36	39	A-75	3VC18ME444	SANTOSH G	36	42
A-38	3VC18ME429	MD IRSHAD J	36	52					

Staff

HOD

Head of the Department,
Mechanical Engineering Department,
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104

CBCS SCHEME

USN | | | | | | | | | | |

17ME32

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019

Material Science

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define APF and coordination number. Calculate the APF for HCP structure. (08 Marks)
b. Differentiate Edge dislocation and screw dislocation. (05 Marks)
c. State and explain Fick's I and II law diffusion. (07 Marks)

OR

2 a. List the mechanical properties in plastic range. Explain them briefly. (08 Marks)
b. With neat sketch, explain S-N diagram and creep curve. (12 Marks)

Module-2

3 a. Define solid solution. Explain the different types of solid solutions. (07 Marks)
b. Explain the factors affecting the formation of solid solution. (05 Marks)
c. Explain Lever rule and Gibbs phase rule with an example. (08 Marks)

OR

4 a. Draw Fe-Fe_3C diagram and indicate the phase temperatures and also write the invariant reaction. (12 Marks)
b. What is homogenious nucleation? Obtain an expression for critical radius of Nuclei. (08 Marks)

Module-3

5 a. Draw T-T-T diagram for 0.8% C and super-impose the cooling curves. Explain briefly. (10 Marks)
b. With neat sketch, explain hardening and tempering heat treatment processes. (10 Marks)

OR

6 a. Explain the Age hardening of Al-Cu alloys. (05 Marks)
b. With neat sketches explain Flame Hardening. (06 Marks)
c. List the properties and applications of Gray cast Iron, Malleable Cast Iron and S.G. Iron. (09 Marks)

Module-4

7 a. Define ceramics and what are its types? (06 Marks)
b. Enumerate Electrical and Mechanical properties of ceramics. (08 Marks)
c. Write the uses of plastics in the various field of engineering. (06 Marks)

OR

8 a. Differentiate the thermo plastics and thermo setting plastics. (05 Marks)

b. With a neat sketch explain the processing of plastics using injection moulding method. (10 Marks)

c. Write a note on properties and applications of smart materials. (05 Marks)

Module-5

9 a. Define composites. Give its classification. (05 Marks)

b. With a neat sketch, explain pultrusion process. (08 Marks)

c. What are the advantages and applications of composites? (07 Marks)

OR

10 a. Derive an equation for Young's modulus of FRP composites using:

i) Iso-strain condition

ii) Iso-stress condition (14 Marks)

b. Calculation the tensile modulus of elasticity of unidirectional carbon fibre reinforced composite material contains 62% by volume of carbon-fibres in

i) Iso-stress condition

ii) Iso-strain condition

Take: $E_{carbon\ fibre} = 37.86 \times 10^4\ N/mm^2$

$E_{epoxy} = 42 \times 10^2\ N/mm^2$ (06 Marks)

* * * * *

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

COURSE EXIT SURVEY

Staff Name: Prof. R H M Somanath Swamy	**Semester: III**	**Sec: A**
Course Name: Material Science	**Course Code: 17C202**	**Total contact hours: 50**
Academic year: 2018-19	**Prerequisites:** This subject requires the basic knowledge of Mechanics, Mathematics, Physics & Chemistry.	

Excellent - 5, Very Good - 4, Good - 3, Average - 2, Below Average - 1

Course Outcome		5	4	3	2	1
At the end of the course, students will be able to ….						
17C202.1	Understand the mechanical properties of metals, their alloys and various modes of failure.					
17C202.2	Describe the microstructures of ferrous and non-ferrous materials and their mechanical properties.					
17C202.3	Interpret the processes of heat treatment of various alloys.					
17C202.4	Discuss the properties, potentialities of various materials available and material selection procedures.					
17C202.5	Explain about the composite materials, their processing and applications.					

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

R NO.	USN	STUDENT NAME	17C202.1	17C202.2	17C202.3	17C202.4	17C202.5	Student Sign
A-1	3VC17ME001	AJAY REDDY N	4	4	3	5	4	
A-2	3VC17ME002	AKASHA GOUDA H	4	3	5	4	5	
A-3	3VC17ME003	ANIL KITTUR	5	3	4	3	3	
A-4	3VC17ME004	BHARATHISHA A B	3	4	5	3	3	
A-5	3VC17ME005	BHARGHAV R	3	4	3	5	5	
A-6	3VC17ME006	C ESHWAR	5	5	4	3	4	
A-7	3VC17ME007	DEEPAK PATIL S R	5	3	3	3	4	
A-8	3VC17ME008	DODDA BASAVA B	4	4	4	3	4	
A-9	3VC17ME009	DURJAYA K B	4	3	3	3	4	
A-10	3VC17ME010	EARESH VARMA C	3	3	3	5	4	
A-11	3VC17ME011	EKNATH GHANTE	5	4	5	5	3	
A-12	3VC17ME012	ERANAGOUDA K M	5	5	5	4	4	
A-13	3VC17ME013	G R RAJESH KUMAR	4	3	5	4	5	
A-14	3VC17ME014	G RANJITH	4	4	3	3	5	
A-15	3VC17ME015	G RANJITH KUMAR	5	4	4	4	5	
A-16	3VC17ME016	G S SREE HARSHA	4	5	5	4	4	
A-17	3VC17ME018	GANESH GOWDA M	4	3	4	4	4	
A-18	3VC17ME019	GANESH J	3	5	4	3	3	
A-19	3VC17ME020	GURUSIDDANA GOUDA B	3	4	5	3	4	
A-20	3VC17ME021	HAMPANNA	5	3	5	4	5	
A-21	3VC17ME022	HANUMESH	5	3	4	3	4	
A-22	3VC17ME023	JAFERSADIQ M ABDUL KHADER BASHA	4	5	3	3	4	
A-23	3VC17ME024	JAGADEESH	5	3	5	5	3	
A-24	3VC17ME025	JEFFREY SUJAN KUMAR K	4	4	3	3	4	
A-25	3VC17ME026	K VINAY	5	5	5	5	3	
A-26	3VC17ME027	KADUBURU MATH PARIKSHITH	5	5	5	4	5	
A-27	3VC17ME028	KAISARAHMED D	5	4	3	5	3	
A-28	3VC17ME029	KARTHIK KUMAR D	4	3	3	5	4	
A-29	3VC17ME030	KARTHIK R B	5	3	3	3	5	
A-30	3VC17ME031	KIRAN MATH	3	4	5	3	3	
A-31	3VC17ME032	LOKESHA NAIK	3	5	4	4	3	
A-32	3VC17ME033	M CHAITANYA	5	4	5	5	5	
A-33	3VC17ME040	MD NOOR AHMED	5	4	5	3	4	
A-34	3VC17ME041	MOHAMMED AZAM J	3	5	5	5	3	
A-35	3VC17ME043	MOHAN E	3	4	5	4	5	
A-36	3VC17ME046	NAVEEN SURAGOUNI	4	3	3	4	3	
A-37	3VC17ME049	PAVAN KUMAR B	5	5	5	4	5	
A-38	3VC18ME429	MD IRSHAD J	4	5	4	3	3	
A-39	3VC17ME054	PAVITHRA R	4	3	3	4	3	
A-40	3VC16ME110	SUSHRUTH G BHAT	3	4	5	4	3	
A-41	3VC18ME461	VISHWANATH GOWDA K	5	3	3	3	3	
A-42	3VC18ME454	THIPPESWAMY B	4	3	3	5	3	
A-43	3VC16ME100	SIRAJ AHAMED	3	4	3	5	5	
A-44	3VC16ME007	ABHISHEK SINHA	4	3	4	3	5	
A-45	3VC18ME423	MADHUSUDHAN B	4	4	3	5	4	
A-46	3VC18ME441	SAGAR MP	3	4	5	3	3	
A-47	3VC18ME464	YESHWANTH D	5	3	5	4	5	
A-48	3VC18ME405	K BHARATH KUMAR	3	4	5	4	5	
A-49	3VC18ME406	BOYA VENKATESH	4	3	4	4	3	
A-50	3VC18ME433	NISAR AHAMED K M	4	3	5	4	3	
A-51	3VC18ME449	SHIVA SHANKAR ADUR	3	3	5	4	3	
A-52	3VC18ME420	KUMAR K	4	3	3	4	4	

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

R NO.	USN	STUDENT NAME	17C202.1	17C202.2	17C202.3	17C202.4	17C202.5	Student Sign
A-53	3VC18ME425	MANIKANTA K	4	4	4	5	5	
A-54	3VC18ME413	IMRAN ABDUL WAHEED BELGUMI	4	5	4	3	3	
A-55	3VC17ME081	VINAY KUMAR S	4	3	3	3	3	
A-56	3VC18ME458	VINAY KUMAR K	3	3	5	4	3	
A-57	3VC18ME457	V SIDDHI VINAYAKA	4	3	3	3	3	
A-58	3VC18ME431	MULLA ALTAF HUSSAIN	3	5	3	5	3	
A-59	3VC18ME443	SAMPATH KUMAR Y M	3	4	3	5	5	
A-60	3VC18ME434	G PAVAN KALYAN	4	3	3	3	4	
A-61	3VC18ME410	H CHETHAN KUMAR	4	4	3	3	5	
A-62	3VC18ME459	VINOD KUMAR B	4	5	3	5	3	
A-63	3VC18ME462	VYSHNAVI	3	3	3	3	4	
A-64	3VC18ME421	LAKSHMAN H	5	4	4	5	4	
A-65	3VC18ME402	ANIL KUMAR V	5	5	4	3	4	
A-66	3VC18ME435	PAVITHRA K	3	3	3	5	4	
A-67	3VC18ME411	H M UDAY KUMAR	4	3	3	5	5	
A-68	3VC18ME424	MAHANTESH H M	3	3	3	3	4	
A-69	3VC18ME415	K VINAY KUMAR	5	3	5	3	3	
A-70	3VC18ME418	KIRAN KUMAR D	4	3	4	3	5	
A-71	3VC18ME446	K SHIVA KUMAR	5	3	4	4	5	
A-72	3VC18ME401	ANAND K R	3	5	3	3	4	
A-73	3VC18ME455	THIPPESWAMY R	5	3	5	4	5	
A-74	3VC18ME460	VISHWANATH H	5	5	5	4	5	
A-75	3VC18ME444	SANTOSH G	4	3	4	4	5	

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

Department of Mechanical Engineering

COURSE SELF ASSESSMENT REPORT

Staff Name: Prof. R H M Somanath Swamy	**Semester: III**	**Sec: A**
Course Name: Material Science	**Course Code: 17C202**	**Total contact hours: 50**
Academic year: 2018-19	**Prerequisites:** This subject requires the basic knowledge of Mechanics, Mathematics, Physics & Chemistry.	

Sl. No.	Questionnaires	Ratings				
		Excellent (5)	Very Good (4)	Good (3)	Fair (2)	Poor (1)
01	Rate your proficiency in understanding the different type of the materials.					
02	Rate your proficiency in understanding the characteristics like strength, ductility, toughness, hardness etc. of materials in different situations.					
03	Are you able to differentiate types of material failures?					
04	Rate your ability to explain the Concept of alloys, solid solutions, factors affecting solid Solubility.					
05	Are you able to explain iron carbon equilibrium diagram and Effect of common alloying elements?					
06	Rate your ability to explain types of heat treatment process and its applications?					
07	Are you able to explain processing of ceramic material and its applications?					
08	Are you able to explain processing of plastic material and its applications?					
09	Are you able to explain properties of different smart materials and its applications?					
10	Are you able to explain types of composite material, processing of composite material and its applications?					

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

R NO.	USN	STUDENT NAME	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Student Sign
A-1	3VC17ME001	AJAY REDDY N	3	5	5	3	4	3	5	3	3	3	
A-2	3VC17ME002	AKASHA GOUDA H	3	3	3	3	4	4	5	4	4	5	
A-3	3VC17ME003	ANIL KITTUR	5	4	3	4	4	5	5	4	4	4	
A-4	3VC17ME004	BHARATHISHA A B	3	3	3	4	4	5	3	5	5	3	
A-5	3VC17ME005	BHARGHAV R	4	3	4	4	3	4	4	5	3	3	
A-6	3VC17ME006	C ESHWAR	4	3	5	4	5	5	5	4	3	3	
A-7	3VC17ME007	DEEPAK PATIL S R	3	5	3	4	5	4	5	3	3	3	
A-8	3VC17ME008	DODDA BASAVA B	4	5	5	5	3	5	3	3	3	4	
A-9	3VC17ME009	DURJAYA K B	3	5	5	4	5	5	5	3	4	5	
A-10	3VC17ME010	EARESH VARMA C	3	3	4	4	3	5	3	3	4	3	
A-11	3VC17ME011	EKNATH GHANTE	5	4	3	5	3	3	4	3	4	3	
A-12	3VC17ME012	ERANAGOUDA K M	3	4	3	4	3	5	3	4	5	5	
A-13	3VC17ME013	G R RAJESH KUMAR	4	5	4	5	5	4	4	4	4	5	
A-14	3VC17ME014	G RANJITH	3	3	4	3	4	5	4	4	3	4	
A-15	3VC17ME015	G RANJITH KUMAR	5	3	3	5	3	4	5	3	5	5	
A-16	3VC17ME016	G S SREE HARSHA	5	4	3	5	3	3	4	4	5	5	
A-17	3VC17ME018	GANESH GOWDA M	4	4	4	4	4	3	4	4	4	4	
A-18	3VC17ME019	GANESH J	3	5	4	3	4	3	4	4	5	3	
A-19	3VC17ME020	GURUSIDDANA GOUDA B	3	5	5	3	4	4	3	5	4	4	
A-20	3VC17ME021	HAMPANNA	5	5	3	3	4	3	5	3	5	3	
A-21	3VC17ME022	HANUMESH	3	4	4	4	4	5	4	5	5	5	
A-22	3VC17ME023	JAFERSADIQ M ABDUL KHADER BASHA	3	4	5	4	3	4	5	5	5	4	
A-23	3VC17ME024	JAGADEESH	5	5	5	3	3	4	4	3	5	5	
A-24	3VC17ME025	JEFFREY SUJAN KUMAR K	5	3	3	3	5	5	4	4	3	4	
A-25	3VC17ME026	K VINAY	5	5	4	4	3	4	5	3	5	3	
A-26	3VC17ME027	KADUBURU MATH PARIKSHITH	3	3	5	4	5	5	4	4	3	4	
A-27	3VC17ME028	KAISARAHMED D	5	3	3	4	5	5	3	5	4	3	
A-28	3VC17ME029	KARTHIK KUMAR D	5	3	5	5	4	4	3	5	3	3	
A-29	3VC17ME030	KARTHIK R B	4	3	3	5	3	5	4	4	3	3	
A-30	3VC17ME031	KIRAN MATH	4	4	5	4	5	5	5	4	5	4	
A-31	3VC17ME032	LOKESHA NAIK	5	3	3	4	4	3	3	4	4	5	
A-32	3VC17ME033	M CHAITANYA	3	3	3	5	3	3	3	3	3	5	
A-33	3VC17ME040	MD NOOR AHMED	4	5	4	5	3	3	3	3	5	4	
A-34	3VC17ME041	MOHAMMED AZAM J	5	5	3	4	3	5	4	5	3	3	
A-35	3VC17ME043	MOHAN E	3	3	3	3	5	5	3	3	4	5	
A-36	3VC17ME046	NAVEEN SURAGOUNI	4	3	5	3	4	3	4	3	4	5	
A-37	3VC17ME049	PAVAN KUMAR B	4	5	4	5	3	3	5	3	5	4	
A-38	3VC18ME429	MD IRSHAD J	3	3	5	4	3	5	5	3	4	5	
A-39	3VC17ME054	PAVITHRA R	3	3	3	3	3	5	4	5	5	3	
A-40	3VC16ME110	SUSHRUTH G BHAT	4	4	5	3	3	3	4	4	5	5	
A-41	3VC18ME461	VISHWANATH GOWDA K	4	4	4	3	5	4	4	4	3	3	
A-42	3VC18ME454	THIPPESWAMY B	3	5	3	5	3	3	3	4	3	3	
A-43	3VC16ME100	SIRAJ AHAMED	3	4	5	4	5	4	5	3	4	4	
A-44	3VC16ME007	ABHISHEK SINHA	5	3	3	3	5	3	3	5	4	4	
A-45	3VC18ME423	MADHUSUDHAN B	5	4	4	5	3	4	3	4	5	5	
A-46	3VC18ME441	SAGAR MP	5	3	4	3	3	5	5	3	4	3	
A-47	3VC18ME464	YESHWANTH D	4	4	5	5	5	5	4	4	3	4	
A-48	3VC18ME405	K BHARATH KUMAR	5	5	4	5	4	4	3	5	5	5	
A-49	3VC18ME406	BOYA VENKATESH	5	5	4	4	5	5	3	3	5	5	
A-50	3VC18ME433	NISAR AHAMED K M	3	4	4	3	5	3	5	5	3	3	
A-51	3VC18ME449	SHIVA SHANKAR ADUR	5	4	3	3	3	4	3	5	3	5	
A-52	3VC18ME420	KUMAR K	5	3	3	5	4	3	5	3	5	3	

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

R NO.	USN	STUDENT NAME	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Student Sign
A-53	3VC18ME425	MANIKANTA K	5	4	4	4	4	4	3	5	3	5	
A-54	3VC18ME413	IMRAN ABDUL WAHEED BELGUMI	4	4	4	3	3	5	5	4	5	3	
A-55	3VC17ME081	VINAY KUMAR S	3	5	3	3	3	5	5	4	4	4	
A-56	3VC18ME458	VINAY KUMAR K	4	3	4	3	4	5	3	3	5	3	
A-57	3VC18ME457	V SIDDHI VINAYAKA	3	3	5	3	5	3	4	5	5	3	
A-58	3VC18ME431	MULLA ALTAF HUSSAIN	5	5	3	4	4	5	5	3	3	3	
A-59	3VC18ME443	SAMPATH KUMAR Y M	4	3	3	5	3	3	4	5	4	3	
A-60	3VC18ME434	G PAVAN KALYAN	5	4	3	3	5	3	4	3	3	4	
A-61	3VC18ME410	H CHETHAN KUMAR	3	5	5	3	5	5	4	3	5	3	
A-62	3VC18ME459	VINOD KUMAR B	3	3	5	4	4	3	3	3	3	5	
A-63	3VC18ME462	VYSHNAVI	5	4	4	5	3	3	4	3	4	3	
A-64	3VC18ME421	LAKSHMAN H	3	5	5	5	4	4	3	4	3	3	
A-65	3VC18ME402	ANIL KUMAR V	3	5	5	5	3	4	5	3	4	5	
A-66	3VC18ME435	PAVITHRA K	4	4	3	4	3	3	5	5	3	4	
A-67	3VC18ME411	H M UDAY KUMAR	4	4	4	3	3	3	3	4	4	4	
A-68	3VC18ME424	MAHANTESH H M	3	3	5	5	5	3	3	3	5	5	
A-69	3VC18ME415	K VINAY KUMAR	3	5	5	5	4	3	3	5	4	4	
A-70	3VC18ME418	KIRAN KUMAR D	4	4	3	3	5	5	4	5	5	4	
A-71	3VC18ME446	K SHIVA KUMAR	3	3	5	3	4	3	5	3	5	3	
A-72	3VC18ME401	ANAND K R	5	4	3	3	4	3	3	3	3	5	
A-73	3VC18ME455	THIPPESWAMY R	3	5	4	4	5	4	3	4	4	4	
A-74	3VC18ME460	VISHWANATH H	3	4	4	4	5	3	5	3	3	4	
A-75	3VC18ME444	SANTOSH G	4	4	4	3	5	4	4	3	5	3	

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI

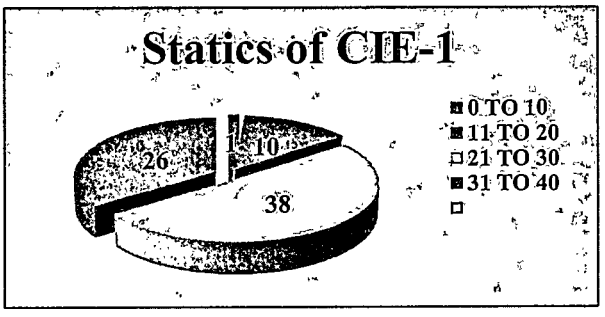
Department of Mechanical Engineering

FINAL RESULT ANALYSIS

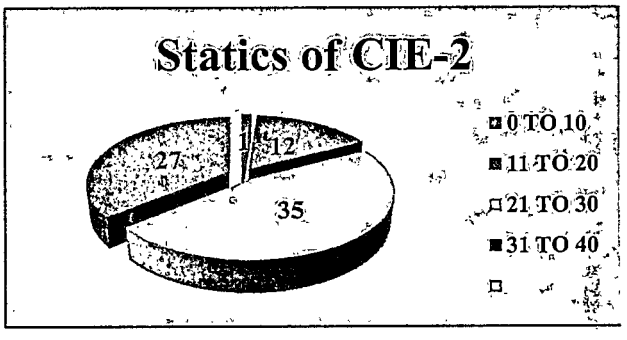
Result analysis has been done w.r.t **CIE** and **SEE** for the academic year 2018-2019.

STATISTICS OF CONTINUOUS INTERNAL EVALUATION

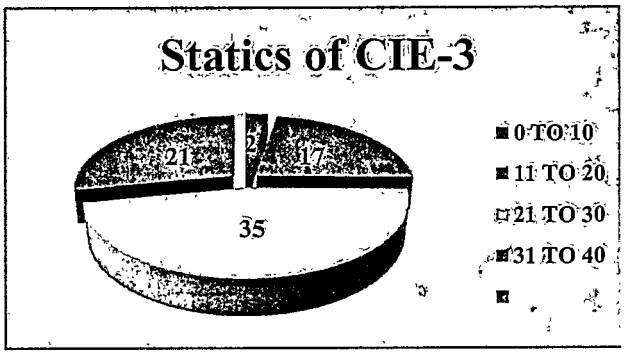
CIE - 1		No. of Students
Marks Range	0 TO 10	1
	11 TO 20	10
	21 TO 30	38
	31 TO 40	26
Total Number of Students		75



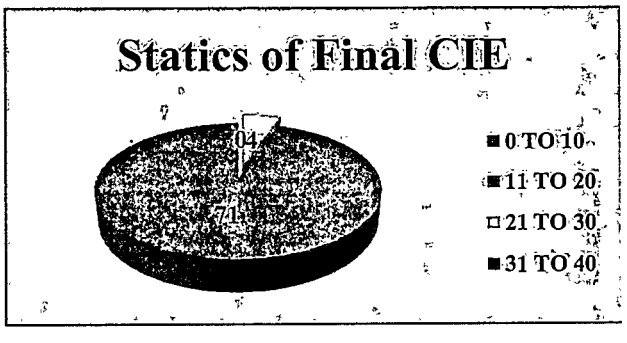
CIE - 2		No. of Students
Marks Range	0 TO 10	1
	11 TO 20	12
	21 TO 30	35
	31 TO 40	27
Total Number of Students		75



CIE - 3		No. of Students
Marks Range	0 TO 10	2
	11 TO 20	17
	21 TO 30	35
	31 TO 40	21
Total Number of Students		75

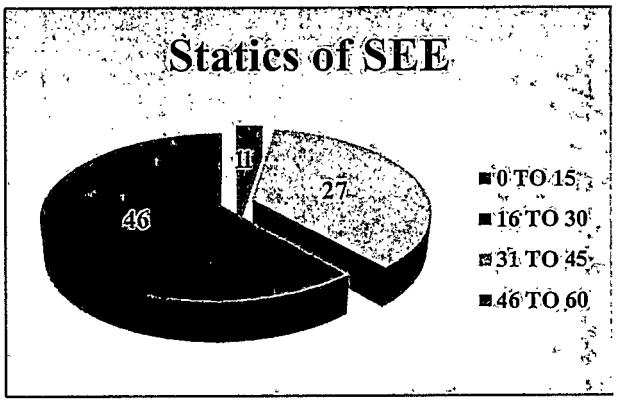


FINAL CIE		No. of Students
Marks Range	0 TO 10	0
	11 TO 20	0
	21 TO 30	4
	31 TO 40	71
Total Number of Students		75

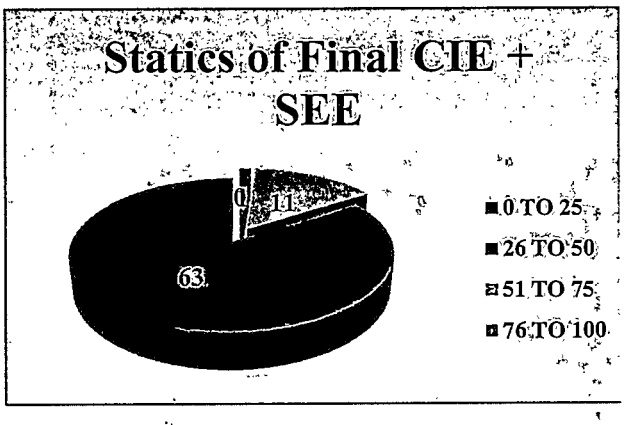


RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

SEE		No. of Students
Marks Range	0 TO 15	1
	16 TO 30	1
	31 TO 45	27
	46 TO 60	46
Total Number of Students		75



Final CIE + SEE		No. of Students
Marks Range	0 TO 25	0
	26 TO 50	1
	51 TO 75	11
	76 TO 100	63
Total Number of Students		75



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

DIRECT CO ATTAINMENT GAP ANALYSIS 2018-19

Course Outcomes	CO Direct Attainment ={0.70(SEE)+0.30(CIE)}*100	CO Target	CO Attainment	CO Attainment Gap
17C202.1	0.94	60	62.86	Nil
17C202.2	0.95	60	68.05	Nil
17C202.3	0.95	60	60.44	Nil
17C202.4	0.95	60	63.06	Nil
17C202.5	0.96	60	60.77	Nil

ACTION REPORT ON GAP ANALYSIS

Course Outcomes	Action Proposed to bridge the gap	Action Proposed
17C202.1	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.2	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.3	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.4	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.5	Target Achieved	Target achieved to the marginal level. Plan for improvement.

COURSE COMMITTEE CO MECH RYMEC

Head of the Department,
Mechanical Engineering Department
R.Y.M. Engineering Collage,
Cantonment, BELLARY-583 104

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

DIRECT & INDIRECT CO ATTAINMENT GAP ANALYSIS 2018-19

Course Outcomes	CO Direct & Indirect Attainment ={0.20(indirect attainment)+0.80(direct attainment)}*100	CO Target	CO Attainment	CO Attainment Gap
17C202.1	0.91	60	60.91	Nil
17C202.2	0.92	60	65.57	Nil
17C202.3	0.92	60	58.39	1.61
17C202.4	0.91	60	60.93	Nil
17C202.5	0.93	60	58.64	1.36

ACTION REPORT ON GAP ANALYSIS

Course Outcomes	Action Proposed to bridge the gap	Action Proposed
17C202.1	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.2	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.3	1.61	Suitable action to be initiated to fill the gap at the course coordinator level by having more elaborated discussions on topics, remedial classes to improve academic performance, Additional classes/tutorial, real engineering applications.
17C202.4	Target Achieved	Target achieved to the marginal level. Plan for improvement.
17C202.5	1.36	Suitable action to be initiated to fill the gap at the course coordinator level by having more elaborated discussions on topics, remedial classes to improve academic performance, Additional classes/tutorial, real engineering applications.

COURSE COMMITTEE
CO
MEET
RYMEC

Head of the Department,
Mechanical Engineering Department,
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Mechanical Engineering

INSTRUCTOR REPORT 2018-19

Impact of Delivery Methods (state the delivery methods used and its effectiveness):

- Delivery methods followed are chalk, marker, board & PPT.
- Chalk & Board is better mode of teaching to make the students to understand the concepts in a sequence and quote the real time examples by writing sketches and related points on the board instantly and comfortably as and when required.
- PPT is used to improve the effectiveness of teaching theory portion by presenting colorful images, videos and content beyond syllabus can also be covered. More exposure can be given to the student community at par with the current industry scenario, more detailed explanation is possible, time saving.
- Use of Videos, Models and specimens also help the student to learn the concepts very effectively and quickly. It enhances self-learning and better understanding ability. It is very much useful to understand the working principals of different processes.

Course Outcome Attainment Remarks :

Suitable action will be initiated to achieve the set targets and higher targets will be set for the next immediate batch after achieving the set targets.

Course Owner Feedback:

a) Instructor Feedback :

This particular subject is one of the basic subjects in Mechanical engineering program. This subject is the basic for understanding various subjects at higher semester. The knowledge of this subject will make students to think about career in the field materials and Research areas. There is a ample scope for the students to contribute in the field of materials especially in composite materials and smart materials.

This subject demands detailed explanation about the history, origin, evolution, properties, processing, and applications of various types of materials.

This subject also requires the knowledge of other subjects like engineering physics, engineering chemistry, etc.

b) Scope for improvement:

- Scope to increase number of contact hours, sharing more information about the current trends in material processing and research areas.
- Motivating the students to carry out research work in composite materials and smart materials for certain useful applications.

Signature of Staff

RAO BAHADUR Y MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
DEPARTMENT OF MECHANICAL ENGNEERING
DIRECT ATTAINMENT 2018-19

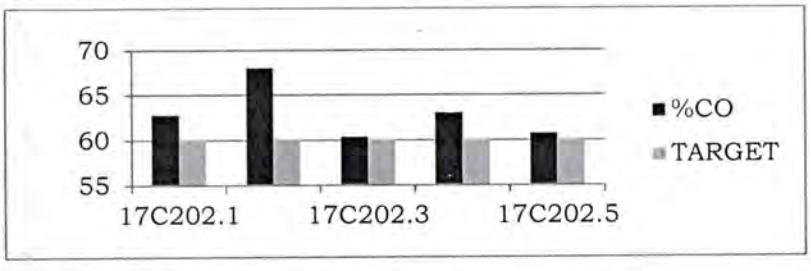
Faculty: R H M Somanath Swamy **Code:** 17ME32
Subject: Material Science
SEM: III **SEC:** A

COURSE OUTCOME STATEMENT	
17C202.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
17C202.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties
17C202.3	Explain the processes of heat treatment of various alloys.
17C202.4	Understand the properties and potentialities of various materials available and material selection procedures
17C202.5	Explain about the composite materials and their processing as well as applications.

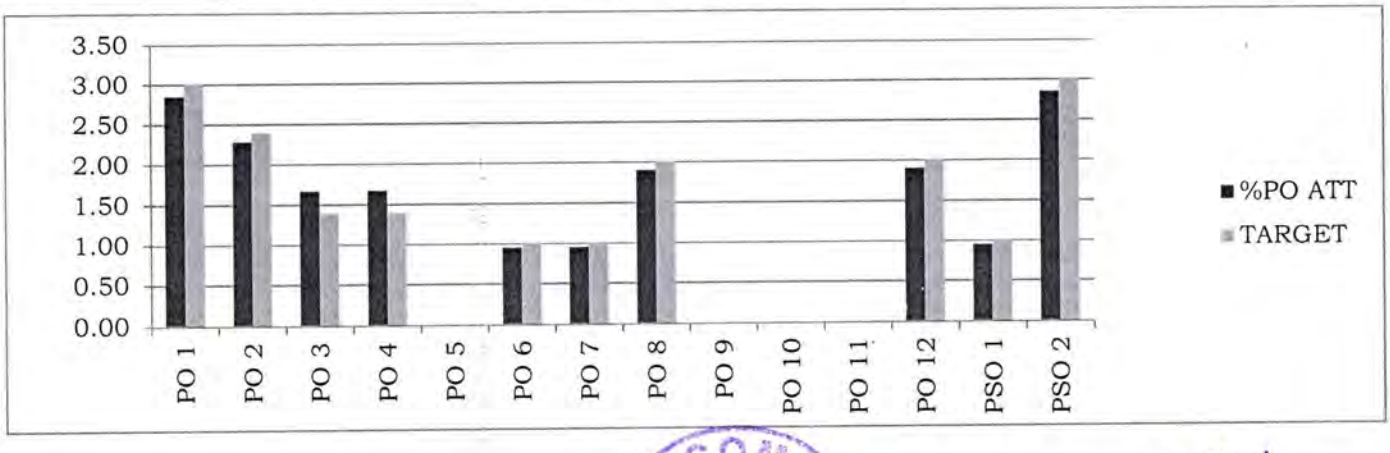
CO-PO/PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
17C202.1	3	2	1	1`	0	0	0	2	0	0	0	2	1	3
17C202.2	3	3	1`	1	0	0	0	2	0	0	0	2	1	3
17C202.3	3	2	2	2	0	1	1	2	0	0	0	2	1	3
17C202.4	3	3	2	2	0	1	1	2	0	0	0	2	1	3
17C202.5	3	2	2	2	0	1	1	2	0	0	0	2	1	3

	%CO	TARGET
17C202.1	62.86	60
17C202.2	68.05	60
17C202.3	60.44	60
17C202.4	63.06	60
17C202.5	60.77	60



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
%PO ATT	2.85	2.28	1.67	1.67		0.95	0.95	1.90				1.90	0.95	2.85
TARGET	3	2.4	1.4	1.4		1	1	2				2	1	3



COURSE COMMITTEE CC MECH RYMEC

Head of the Department
Mechanical Engineering Department
R.Y.M. Engineering Collage,
Cantonment, BELLARY-583 104

RAO BAHADUR Y MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
DEPARTMENT OF MECHANICAL ENGNEERING
DIRECT AND INDIRECT ATTAINMENT 2018-19

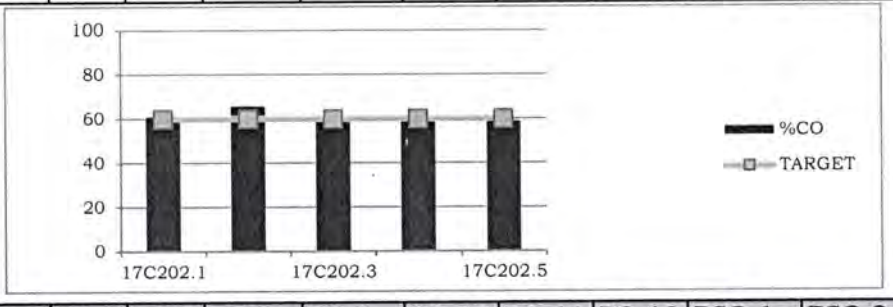
Faculty: R H M Somanath Swamy **Code:** 17ME32
Subject: Material Science
SEM: III **SEC:** A

COURSE OUTCOME STATEMENT	
17C202.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
17C202.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties
17C202.3	Explain the processes of heat treatment of various alloys.
17C202.4	Understand the properties and potentialities of various materials available and material selection procedures
17C202.5	Explain about the composite materials and their processing as well as applications.

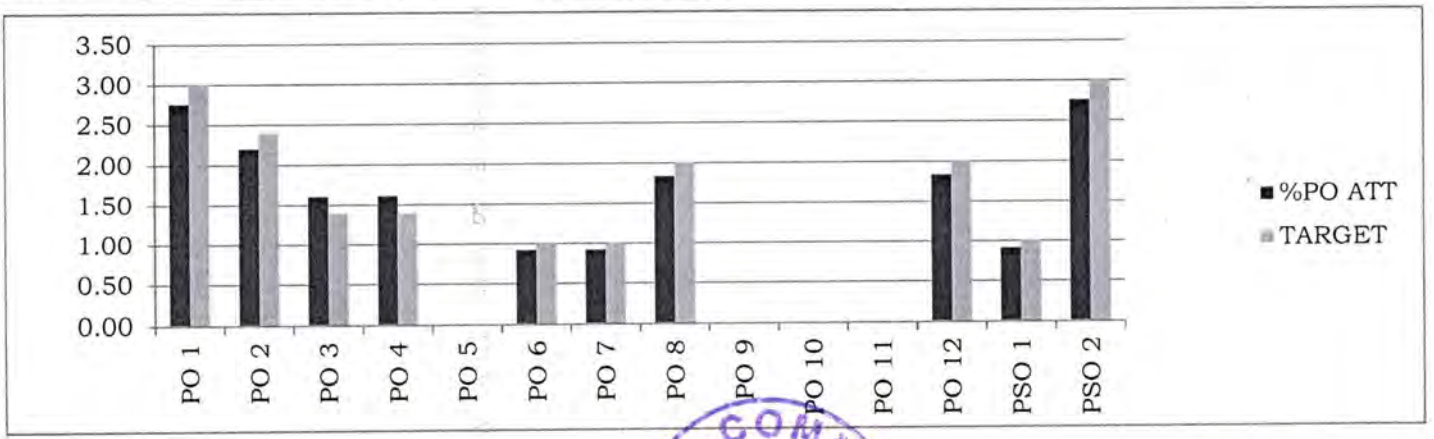
CO-PO/PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
17C202.1	3	2	1	1	0	0	0	2	0	0	0	2	1	3
17C202.2	3	3	1	1	0	0	0	2	0	0	0	2	1	3
17C202.3	3	2	2	2	0	1	1	2	0	0	0	2	1	3
17C202.4	3	3	2	2	0	1	1	2	0	0	0	2	1	3
17C202.5	3	2	2	2	0	1	1	2	0	0	0	2	1	3

	%CO	TARGET
17C202.1	60.91	60
17C202.2	65.57	60
17C202.3	58.39	60
17C202.4	60.93	60
17C202.5	58.64	60



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
%PO ATT	2.76	2.20	1.61	1.61		0.92	0.92	1.84				1.84	0.92	2.76
TARGET	3	2.4	1.4	1.4		1	1	2				2	1	3



COURSE COMMITTEE CC MECH RYMEC

Head of the Department,
Mechanical Engineering Department,
R.Y.M. Engineering College,
Cantonment, BELLARY-583 104