



G.Pullaiah College of Engineering and Technology

(Autonomous)

(Approved by AICTE, New Delhi | NAAC Accreditation with 'A' Grade |

Accredited by NBA (CSE, ECE & EEE) | Affiliated to JNTUA)

Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

DATE: 08-03-2023

To

The Principal,
GPCET,
Kurnool.

Sir,

Sub: Approval of ADD-ON course for II ME, III ME & IV ME Students-Regd

The department of ME requests you to accept the proposal for conducting ADD-ON Course on "**Introduction To Solidification Processing**" for the odd semester of II, III & IV year ME students scheduled for the duration of 42 hours. Kindly accept the proposal.

Thanking you sir,

Yours Sincerely

HOD-ME

PRINCIPAL

G.Pullaiah College of Engg & Tech.
Nandikotkur Road, VENKAYAPALLI
KURNOOL-518 452 (A.P)



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Department Circular –ADD-ON Course

DATE: 09-03-2023

The Iyear, III year & IV year-II semester ME Students are informed to enroll their names for ADD-ON Course on “**Introduction To Solidification Processing**” with their respective class-in-charges on or before 12-03-2023. The course commences from 13th March and the duration of the course is for 42 hours. The course is conducted from 4 pm to 5 pm regularly.

Bus facility is made available soon after the class work.

HOD-ME



**G. PULLAIAH COLLEGE OF
ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)**

Department Of Mechanical Engineering

ADD ON COURSE



**Topic : Introduction To Solidification
Processing**

Target audience : II and III Year Students

Total Courses Duration : 42 hrs

**Selection Procedure : Registration on First
come First serve basis**



Date of commencement of the course : 13 March, 2023.

End of Course : 20 Apr, 2023.

Exam Date: 24 Apr,2023.

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**SYLLABUS FOR ADD-ON COURSE ON INTRODUCTION TO SOLIDIFICATION
PROCESSING**

DAY	TOPICS
1	Introduction to phase diagram
2	Single component system
3	Binary solutions
4	Simulation or demonstration with examples
5	Equilibrium of heterogeneous systems
6	Influence of interfaces on equilibrium
7	Simulation or demonstration with examples
8	Nucleation in pure metals
9	Heterogeneous nucleation
10	Growth of pure metals
11	Simulation of nucleation and growth
12	Solidification of alloys
13	Eutectic solidification

Ram



G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY: KURNOOL (Autonomous)

Department of Mechanical Engineering

The following is the list of the students who have attended Add on Course on "Introduction To Solidification Processing"

S.No	ROLL NO	Name of the Candidate
1	19AT1A0301	SYED ABBAS
2	19AT1A0302	K. ABHI RAM MANIKANTA YADHAV
3	19AT1A0303	SHAIK AFROZ BASHA
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46	20AT1A0353	M JAYA TEJA

Ravi

G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOG
DEPARTMENT OF MECHANICAL ENGINEERING
ADDON COURSE SCHEDULE

Date: 24/04/2023

III&IV YEAR – II Semester		
Course	Faculty	Duration
Introduction to phase diagram	DR. K.MALLIKARJUNA	3 hours
Single component system	DR. K.MALLIKARJUNA	3 hours
Binary solutions	DR. K.MALLIKARJUNA	2 hours
Simulation or demonstration with examples	DR.S.VENKATESHWALU	3 hours
Equilibrium of heterogeneous systems	DR.S.VENKATESHWALU	3 hours
Influence of interfaces on equilibrium	DR.S.VENKATESHWALU	2 hours
Simulation or demonstration with examples	DR.S.VENKATESHWALU	2 hours
Nucleation in pure metals	Mr.S.Abdul Azeez	3 hours
Heterogeneous nucleation	Mr.S.Abdul Azeez	3 hours
Growth of pure metals	Mr.S.Abdul Azeez	3 hours
Simulation of nucleation and growth	Mr.S.Abdul Azeez	2 hours
Solidification of alloys	Mr.S.Abdul Azeez	2 hours
Eutectic solidification	Mr.S.Abdul Azeez	2 hours
Simulation or demonstration with examples	Mr.S.Abdul Azeez	2 hours

Prasad

G. PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II, III & IV B. Tech I SEM Objective Paper – Assessment

Branch: MECHANICAL ENGINEERING

Sub: Introduction to Solidification Processing

Date: 24/04/2024

Time: 30 min

Max.Marks:25

Roll No:

Invigilator signature:

I.MULTIPLE CHOICE QUESTIONS

1. What is solidification processing primarily concerned with? []
a) Creating gases from solids b) Transforming liquids into solids c) Converting solids into liquids
d) Vaporizing liquids
2. In solidification processing, what is meant by nucleation? []
a) The growth of crystal structures b) The initial formation of solid particles c) The melting of solid materials
d) The transformation of gases into solids
3. Which of the following is a primary factor influencing solidification rate? []
a) Humidity b) Temperature c) Pressure d) Chemical composition
4. What role does undercooling play in solidification processing? []
a) It accelerates solidification b) It retards solidification c) It has no effect on solidification d) It determines the crystal structure
5. What is the critical nucleus size in solidification processing? []
a) The smallest size attainable b) The size where growth begins spontaneously c) The largest size that can form
d) The size where undercooling stops
6. What does the term "dendritic growth" refer to in solidification processing? []
a) Growth in a tree-like structure b) Growth in a linear manner c) Growth in a spherical pattern
d) Growth in a hexagonal pattern
7. How does cooling rate affect the microstructure of solidified materials? []
a) Slower cooling rates result in finer microstructures b) Slower cooling rates result in coarser microstructures
c) Faster cooling rates result in finer microstructures d) Faster cooling rates result in coarser microstructures
8. What is the primary mechanism responsible for dendritic growth in solidification processing? []
a) Diffusion b) Conduction c) Radiation d) Convection
9. What is the purpose of grain refinement in solidification processing? []

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a) To increase the melting point of the material b) To decrease the density of the material
c) To improve mechanical properties d) To reduce the chemical stability of the material

10. Which of the following is NOT a common solidification process? []

a) Casting b) Extrusion c) Welding d) Forging

11. How does impurity concentration affect solidification processing? []

a) Higher impurity concentration accelerates solidification b) Higher impurity concentration retards solidification
c) Impurities have no effect on solidification d) Impurities determine the crystal structure

12. What is the purpose of grain boundary engineering in solidification processing? []

a) To create larger grains b) To eliminate grain boundaries c) To improve mechanical properties
d) To decrease impurity concentration

13. Which of the following is a common defect in solidification processing? []

a) Grain refinement b) Porosity c) Uniformity d) Ductility

14. What is the significance of eutectic reactions in solidification processing? []

a) They determine the crystal structure b) They control the melting point of materials c) They regulate the cooling rate
d) They influence the microstructure

15. Which of the following is a common application of solidification processing? []

a) Water treatment b) Air conditioning c) Metal casting d) Plastic extrusion

16. What is the benefit of directional solidification in solidification processing? []

a) To produce materials with isotropic properties b) To reduce impurity concentration c) To improve mechanical properties
d) To control grain orientation

17. How does alloy composition affect solidification behavior? []

a) Alloy composition has no effect on solidification b) Alloy composition determines the cooling rate
c) Alloy composition influences the microstructure d) Alloy composition accelerates solidification

18. What role does nucleation play in the solidification process? []

a) It determines the crystal structure b) It initiates the formation of solid particles c) It regulates the cooling rate
d) It controls the eutectic reactions

19. What is the primary purpose of seed crystals in solidification processing? []

a) To increase undercooling b) To retard solidification c) To initiate nucleation d) To eliminate grain boundaries

20. Which of the following is a common technique for controlling solidification rate? []

From

a) Increasing impurity concentration b) Decreasing cooling rate c) Increasing undercooling d) Using chill molds

21. What is the primary advantage of rapid solidification processing? []

a) Improved mechanical properties b) Increased impurity concentration c) Fine microstructures d) Slower cooling rates

22. How does the shape of the solidifying interface affect solidification processing? []

a) Shape has no effect on solidification b) Irregular shapes accelerate solidification c) Smooth shapes retard solidification d) Shape influences cooling rate and microstructure

23. What is the purpose of inoculants in solidification processing? []

a) To increase grain size b) To decrease undercooling c) To improve mechanical properties d) To control eutectic reactions

24. Which of the following is NOT a factor affecting solidification processing? []

a) Cooling rate b) Alloy composition c) Grain boundary engineering d) Impurity concentration

25. What is the primary challenge of solidification processing? []

a) Achieving uniform cooling rates b) Controlling impurity concentration c) Preventing defects d) Managing eutectic reactions

Ram



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Department of Mechanical Engineering

Evaluation sheet on Add-on Course on "Introduction To Solidification Processing"

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