

**Curriculum for B. Tech./Dual Degree in  
Metallurgical Engineering and Materials Science**

**For students admitted after 2007**

**(Changes in III, IV & V semester for 2007 batch given at the end)**

# DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE

## B.Tech.

| <i>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</i>                                 |                                    |                         |          |          |          |   |  |                         |          |          |          |
|--|------------------------------------|-------------------------|----------|----------|----------|---|--|-------------------------|----------|----------|----------|
| <b>Semester I</b>  |                                    |                         |          |          |          | <b>Semester – II</b>  |  |                         |          |          |          |
| <b>Course code</b>   | <b>Course Name</b>                 | <b>Credit Structure</b> |          |          |          | <b>Course Code</b>  | <b>Course Name</b>                             | <b>Credit Structure</b> |          |          |          |
|  |                                    | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b> |   |  | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b> |
| CH 103+<br><b>OR</b><br>PH 103*  | Chemistry                          | 2                       | 1        | 0        | 6        | CH 103*<br><b>OR</b><br>PH 103+   | Chemistry                                      | 2                       | 1        | 0        | 6        |
|  | Electricity and Magnetism          | 2                       | 1        | 0        | 6        |   | Electricity and Magnetism                      | 2                       | 1        | 0        | 6        |
| CS 101   | Computer Programming               | 2                       | 0        | 2        | 6        | MA 106@<br><b>AND</b><br>MA 108@  | Linear Algebra and<br>Differential Equations I | 3                       | 1        | 0        | 4        |
|  |                                    |                         |          |          |          |   |  | 3                       | 1        | 0        | 4        |
| HS 101   | Economics                          | 3                       | 0        | 0        | 6        | IC 102  | Data Analysis and Interpretations              | 2                       | 1        | 0        | 6        |
| MA 105   | Calculus                           | 3                       | 1        | 0        | 8        | MM 152  | Materials and Technology                       | 2                       | 1        | 0        | 6        |
|  |                                    |                         |          |          |          |   |  |                         |          |          |          |
|  |                                    |                         |          |          |          |   |  |                         |          |          |          |
| CH 117+<br><b>OR</b><br>PH 117*  | Chemistry Lab                      | 0                       | 0        | 3        | 3        | CH 117*<br><b>OR</b><br>PH 117+   | Chemistry Lab                                  | 0                       | 0        | 3        | 3        |
|  | Physics Lab                        | 0                       | 0        | 3        | 3        |   | Physics Lab                                    | 0                       | 0        | 3        | 3        |
| ME 113+<br><b>OR</b><br>ME 119*  | Workshop Practice                  | 0                       | 1        | 3        | 5        | ME 113*<br><b>OR</b><br>ME 119+   | Workshop Practice                              | 0                       | 1        | 3        | 5        |
|  | Engineering Graphics and Drawing   | 1                       | 0        | 3        | 5        |   | Engineering Graphics and Drawing               | 1                       | 0        | 3        | 5        |
|  |                                    |                         |          |          |          |   |  |                         |          |          |          |
|  |                                    |                         |          |          |          |   |  |                         |          |          |          |
| NC 101#  | National Cadet Corps (NCC)         | 0                       | 0        | 0        | P/NP     | NC 102#   | National Cadet Corps (NCC)                     | 0                       | 0        | 0        | P/NP     |
| NO 101#  | National Sports Organization (NSO) | 0                       | 0        | 0        | P/NP     | NC 102#   | National Sports Organization (NSO)             | 0                       | 0        | 0        | P/NP     |
| NS 101#  | National Service Scheme (NSS)      | 0                       | 0        | 0        | P/NP     | NS 102#   | National Service Scheme (NSS)                  | 0                       | 0        | 0        | P/NP     |
| * D3 & D4 batches, + D1 D2 batches<br># Any one of these three P/NP courses, half semester each. |                                    |                         |          |          |          | * D3 & D4 batches, + D1 D2 batches<br># Any one of these three P/NP courses @ Half semester courses |  |                         |          |          |          |

**DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**  
**B.Tech.(Contd.)**

| <b>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</b> |   |                         |          |          |           |                                |   |                         |          |          |           |
|--|---|-------------------------|----------|----------|-----------|--------------------------------|---|-------------------------|----------|----------|-----------|
| <b>Semester III</b>  |   |                         |          |          |           | <b>Semester – IV</b>           |   |                         |          |          |           |
| <b>Course code</b>   | <b>Course Name</b>                        | <b>Credit Structure</b> |          |          |           | <b>Course Code</b>             | <b>Course Name</b>                                  | <b>Credit Structure</b> |          |          |           |
|  |   | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |                                |   | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |
| MM 201   | Structure of Materials                    | 2                       | 1        | 0        | 6         | MM 202                         | Thermodynamics of Materials                         | 2                       | 1        | 0        | 6         |
| MM 203   | Mechanics of Materials                    | 2                       | 1        | 0        | 6         | ME 220                         | Theory of Machines and Machine Design               | 2                       | 1        | 0        | 6         |
| EE 101   | Intro. to Electrical Engg. & Electronics  | 3                       | 1        | 0        | 8         | MM 305                         | Kinetics of Processes                               | 2                       | 1        | 0        | 6         |
| MM 204   | Transport Phenomena                       | 2                       | 1        | 0        | 6         | PH 105                         | Modern Physics                                      | 3                       | 1        | 0        | 8         |
|  |   |                         |          |          |           |                                |   |                         |          |          |           |
| IC 211   | Exptn. and Meas. Lab                      | 0                       | 0.5      | 3        | 4         | EE 209                         | Electrical/ Electronics Lab.                        | 0                       | 0        | 3        | 3         |
|  |   |                         |          |          |           | MM 212                         | Metallography and Structural Characterisation Lab.  | 0                       | 0.5      | 3        | 4         |
| <b>Total</b>   |   | <b>9</b>                | <b>5</b> | <b>6</b> | <b>30</b> | <b>Total</b>                   |   | <b>8</b>                | <b>4</b> | <b>3</b> | <b>33</b> |
| COURSES FOR HONORS REQUIREMENT (Elective from the autumn list)   |   |                         |          |          |           | COURSES FOR HONORS REQUIREMENT |   |                         |          |          |           |
| MM 409   | Colloid and Interface Science (suggested) | 2                       | 1        | 0        | 6         | MM 206                         | Experimental Techniques in Materials Science (Core) | 2                       | 1        | 0        | 6         |
|  |   |                         |          |          |           |                                |   |                         |          |          |           |
| COURSES FOR MINOR REQUIREMENT                                    |   |                         |          |          |           | COURSES FOR MINOR REQUIREMENT  |   |                         |          |          |           |
| MM 202   | Thermodynamics of Materials (Core)        | 2                       | 1        | 0        | 6         | MM 201                         | Structure of Materials (Core)                       | 2                       | 1        | 0        | 6         |

**DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**  
**B.Tech.(Contd.)**

| COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH |  |                  |     |     |      |                                |   |                  |   |     |     |
|---|--|------------------|-----|-----|------|--------------------------------|---|------------------|---|-----|-----|
| Semester V  |  |                  |     |     |      | Semester – VI                  |   |                  |   |     |     |
| Course code   | Course Name  | Credit Structure |     |     |      | Course Code                    | Course Name   | Credit Structure |   |     |     |
|   |  | L                | T   | P   | C    |                                |   | L                | T | P   | C   |
| MM 357  | Ceramics and Powder Metallurgy   | 2                | 1   | 0   | 6    | MM 318                         | Electronic Properties of Materials.   | 2                | 1 | 0   | 6   |
| MM 301  | Phase Transformations  | 2                | 1   | 0   | 6    | MM 359                         | Metal Casting and Joining   | 2                | 1 | 0   | 6   |
| HS 301/<br>HS 303/<br>HS 305/<br>HS 307                   | Philosophy/<br>Psychology/<br>Literature/<br>Sociology   | 3                | 0   | 0   | 6    | MM 320                         | Process Metallurgy Principles   | 2                | 1 | 0   | 6   |
| MM 319  | Mechanical Behaviour of Materials  | 2                | 1   | 0   | 6    | MA 214                         | Introduction to Numerical Analysis  | 3                | 1 | 0   | 8   |
| MM 312  | Heat Treatment Lab.  | 0                | 1   | 3   | 5    | MM 322                         | Casting and Joining Lab.  | 0                | 0 | 1.5 | 1.5 |
| MM 362  | Mech. Testing Lab.   | 0                | 0.5 | 1.5 | 2.5  | MM 411                         | Manufacturing Processes Lab.  | 0                | 0 | 1.5 | 1.5 |
|   |  |                  |     |     |      | MM 396                         | Seminar (3 Credits)   | 0                | 0 | 3   | 3   |
|   |  |                  |     |     |      |                                |   |                  |   |     |     |
|   |  |                  |     |     |      |                                |   |                  |   |     |     |
| Total Credits   |  |                  |     |     | 31.5 | Total Credits                  |   |                  |   |     | 32  |
| COURSES FOR HONORS REQUIREMENT                            |  |                  |     |     |      | COURSES FOR HONORS REQUIREMENT |   |                  |   |     |     |
|   | Elective from the autumn sem. list   |                  |     |     |      | MM 493                         | Elective from the spring sem. List or BTP I (6 credits)                           | 0                | 0 | 6   | 6   |
|   |  |                  |     |     |      |                                |   |                  |   |     |     |
| COURSES FOR MINOR REQUIREMENT                             |  |                  |     |     |      | COURSES FOR MINOR REQUIREMENT  |   |                  |   |     |     |
| MM 318  | Electronic Properties of Materials (Core)<br>Prerequisite: MM 201: Structure of Materials (Not available for EP, they can take any elective from list) | 2                | 1   | 0   | 6    | MM 301                         | Phase Transformations (Core)<br>Prerequisite: MM 202: Thermodynamics of Materials | 2                | 1 | 0   | 6   |

**DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**  
**B.Tech. (Contd.)**

| COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH  |  |                  |   |   |    |                         |   |                  |   |     |     |
|--|--|------------------|---|---|----|-------------------------|---|------------------|---|-----|-----|
| Semester VII   |  |                  |   |   |    | Semester – VIII         |   |                  |   |     |     |
| Course code  | Course Name  | Credit Structure |   |   |    | Course Code             | Course Name   | Credit Structure |   |     |     |
|  |  | L                | T | P | C  |                         |   | L                | T | P   | C   |
| MM 401   | Introduction to Process Control Theory and Instrumentation | 2                | 1 | 0 | 6  | MM 454                  | Corrosion and Protection of Materials                                   | 2                | 1 | 0   | 6   |
| MM 453   | Engineering Polymers and Composites                        | 2                | 1 | 0 | 6  |                         | Departmental Elective I #   | 2                | 1 | 0   | 6   |
| MM 304   | Iron and Steel Making                                      | 2                | 1 | 0 | 6  | ES 200<br>And<br>HS 200 | Environmental Studies: Science and Engg<br>And<br>Environmental Studies | 3                | 0 | 0   | 3   |
|  | Institute Elective I                                       | 2                | 1 | 0 | 6  |                         | Institute Elective II   | 2                | 1 | 0   | 6   |
|  |  |                  |   |   |    | MM 426                  | Equipment and Processes Des. Lab.                                       | 0                | 2 | 2   | 6   |
| MM 419   | Computation and Controls Lab.                              | 0                | 1 | 3 | 5  | MM 462                  | Corrosion and Protection Lab.   | 0                | 0 | 1.5 | 1.5 |
| MM 433   | Manufacturing Process Seminar                              | 0                | 0 | 3 | 3  | MM 448                  | Thin Films Lab.   | 0                | 0 | 1.5 | 1.5 |
| MM 388   | Practical Training   | PP/<br>NP        |   |   |    |                         |   |                  |   |     |     |
| Total Credits  |  |                  |   |   | 32 | Total Credits           |   |                  |   |     | 33  |
| # Departmental Elective I:<br>1. MM 404 Mechanical Working of Metals      2 1 0 6<br>2. MM 406 Semiconductor Devices and Processing      2 1 0 6 |  |                  |   |   |    |                         |   |                  |   |     |     |

**COURSES FOR HONORS REQUIREMENT**

|                                      |   |  |  |  |          |
|--------------------------------------|---|--|--|--|----------|
| MM 494                               | Elective from the autumn sem. List or BPT II (6 credits) or       |  |  |  |          |
| MM 493                               | BTP I if not done earlier   |  |  |  |          |
| <b>COURSES FOR MINOR REQUIREMENT</b> |   |  |  |  |          |
|                                      | Elective courses from list: at least one will be placed in slot 5 |  |  |  | <b>6</b> |
|                                      |   |  |  |  |          |

**COURSES FOR HONORS REQUIREMENT**

|                                      |   |  |  |  |          |
|--------------------------------------|---|--|--|--|----------|
| MM 494                               | Elective from the spring sem. List or BTP II if not done earlier  |  |  |  |          |
| <b>COURSES FOR MINOR REQUIREMENT</b> |   |  |  |  |          |
|                                      | Elective courses from list: at least one will be placed in slot 5 |  |  |  | <b>6</b> |
|                                      |   |  |  |  |          |

**Minor in Metallurgical Engineering and Materials Science**  
**Total of 5 courses ( four core and one elective) adding upto 30 credits minimum.**

**Core:**

- 1) MM 202 Thermodynamics of Materials      2 1 0 6
- 2) MM 201 Structure of Materials              2 1 0 6
- 3) MM 302 Electronic Properties of Materials 2 1 0 6  
(Prerequisite: MM 201 Structure of Materials) (Not available for EP students)
- 4) MM 303 Phase Transformations            2 1 0 6  
(Prerequisite: MM 202 Thermodynamics of Materials)

**Electives (any one) have to be chosen from the following list.**

Some of these are departmental core and some electives.

Core courses will run in core slots. At least one or two elective courses will be offered in slot 5 in each semester.

- 1) MM 206 Experimental Techniques in Materials Science      (Honours Core)
- 2) MM 301 Ceramics and Powder Metallurgy                      (Deptl. Core)
- 3) MM 307 Mechanical Behaviour of Matls.                        (Deptl. Core)
- 4) MM 304 Metal Casting and Joining                                (Deptl. Core)
- 5) MM 306 Process Metallurgy Principles                            (Deptl. Core)
- 6) MM 405 Iron and Steel Making                                      (Dept. Core)
- 7) MM 403 Engineering Polymers and Composites                (Deptl. Core)
- 8) MM 402 Corrosion and Protection of Matls.                    (Deptl. Core)
- 9) MM 404 Mechanical Working of Metals                            (Deptl. Core)
- 10) MM 406 Semiconductor Devices and Processing                (Deptl. Core)
- 11) MM 484 Solid Electrolytes    (Honours Elective)
- 12) MM 482 Non-destructive Evaluation                                (Honours Elective)
- 13) MM 473 Electronic Ceramics                                        (Honours Elective)
- 14) MM 474 Science and Technology of Thin Films                (Honours Elective)
- 15) MM 457 Biomaterials    (Honours Elective)

MM 6XX PG courses can be taken by those eligible to do so.

**Honours for B.Tech. students in Metallurgical Engineering and Materials Science**  
**Course MM 206, and BTP I ( 6 credits) are mandatory. Additional 18 credits from elective courses and BTP II.**

**Autumn**

- 1) MM 409 Colloid and Interface Science
- 2) MA 205/207 Complex Analysis+ Diff. Eqns. II
- 3) CE 102 Engineering Mechanics
- 4) BT251 Molecular Cell Biology
- 5) MM 473 Electronic Ceramics
- 6) MM 474 Science and Technology of Thin Films
- 7) MM 457 Biomaterials
- 8) BTP I (6 credits) : not earlier than sixth semester (Core)**
- 9) BTP II (6 credits) : not earlier than seventh semester (prerequisite: minimum BB grade in BTP-I)

**Spring**

- 1) MM 206 Experimental Techniques in Materials Science (Core)**
- 2) MM 486 Microprocessors in Control of Processes
- 3) MM 484 Solid Electrolytes
- 4) MM 482 Non-destructive Evaluation
- 5) MM 404 Mechanical Working
- 6) MM 406 Semiconductor Devices and Processing
- 7) MM 417 Entrepreneurship in Materials Science and Engineering
- 8) BTP I : not earlier than sixth semester
- 9) BTP II: not earlier than seventh semester (prerequisite: minimum BB grade in BTP-I)

MM 6XX PG courses can be taken by those eligible to do so, with instructor's consent.

## **DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**

### **Dual Degree**

**Two Specializations:   1. Ceramics and Composites    2. Metallurgical Process Engineering**

#### **Salient features:**

1. The basic component of the B.Tech. Programme will be done by all the Dual Degree students.
2. In addition they will do
  - honours programme of 30 credits, all through courses, as mentioned under the section on honours below.
  - Four PG level courses, two of which are core specific to the specialization, and two electives from the list of PG electives currently running in the department.
  - A DDP of 72 credits, spread into I stage of 30 credits and II stage of 42 credits, in the 9<sup>th</sup> and the 10<sup>th</sup> semester respectively.
2. The total credit break up therefore is as follows:

|                    |                      |
|--------------------|----------------------|
| B.Tech. Component: | 258.5 credits        |
| Honours :          | 30 credits           |
| DD component 24+72 | 96 credits           |
| <b>Total</b>       | <b>384.5 credits</b> |

#### **Requirements for Honours for Dual Degree students**

The content of the honours programme, which is mandatory, differs from that for B.Tech. students in the following ways:

1. BTP-I and BTP-II are not available to the dual degree students
2. Course can be taken from the list for honours, or any MM 6XX PG course from 5<sup>th</sup> semester onwards.



## Dual Degree : Specialization: Ceramics and Composites

| <i>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</i>            |                                    |                         |          |          |          |   |  |                         |          |          |          |
|---|------------------------------------|-------------------------|----------|----------|----------|---|--|-------------------------|----------|----------|----------|
| <b>Semester I</b>   |                                    |                         |          |          |          | <b>Semester – II</b>  |  |                         |          |          |          |
| <b>Course code</b>  | <b>Course Name</b>                 | <b>Credit Structure</b> |          |          |          | <b>Course Code</b>  | <b>Course Name</b>                             | <b>Credit Structure</b> |          |          |          |
|   |                                    | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b> |   |  | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b> |
| CH 103+<br><b>OR</b><br>PH 103*   | Chemistry                          | 2                       | 1        | 0        | 6        | CH 103*<br><b>OR</b><br>PH 103+   | Chemistry                                      | 2                       | 1        | 0        | 6        |
|   | Electricity and Magnetism          | 2                       | 1        | 0        | 6        |   | Electricity and Magnetism                      | 2                       | 1        | 0        | 6        |
| CS 101  | Computer Programming               | 2                       | 0        | 2        | 6        | MA 106@<br><b>AND</b><br>MA 108@  | Linear Algebra and<br>Differential Equations I | 3                       | 1        | 0        | 4        |
|   |                                    |                         |          |          |          |   |  | 3                       | 1        | 0        | 4        |
| HS 101  | Economics                          | 3                       | 0        | 0        | 6        | IC 102  | Data Analysis and Interpretations              | 2                       | 1        | 0        | 6        |
| MA 105  | Calculus                           | 3                       | 1        | 0        | 8        | MM 152  | Materials and Technology                       | 2                       | 1        | 0        | 6        |
|   |                                    |                         |          |          |          |   |  |                         |          |          |          |
|   |                                    |                         |          |          |          |   |  |                         |          |          |          |
| CH 117+<br><b>OR</b><br>PH 117*   | Chemistry Lab                      | 0                       | 0        | 3        | 3        | CH 117*<br><b>OR</b><br>PH 117+   | Chemistry Lab                                  | 0                       | 0        | 3        | 3        |
|   | Physics Lab                        | 0                       | 0        | 3        | 3        |   | Physics Lab                                    | 0                       | 0        | 3        | 3        |
| ME 113+<br><b>OR</b><br>ME 119*   | Workshop Practice                  | 0                       | 1        | 3        | 5        | ME 113*<br><b>OR</b><br>ME 119+   | Workshop Practice                              | 0                       | 1        | 3        | 5        |
|   | Engineering Graphics and Drawing   | 1                       | 0        | 3        | 5        |   | Engineering Graphics and Drawing               | 1                       | 0        | 3        | 5        |
|   |                                    |                         |          |          |          |   |  |                         |          |          |          |
|   |                                    |                         |          |          |          |   |  |                         |          |          |          |
| NC 101#   | National Cadet Corps (NCC)         | 0                       | 0        | 0        | P/NP     | NC 102#   | National Cadet Corps (NCC)                     | 0                       | 0        | 0        | P/NP     |
| NO 101#   | National Sports Organization (NSO) | 0                       | 0        | 0        | P/NP     | NC 102#   | National Sports Organization (NSO)             | 0                       | 0        | 0        | P/NP     |
| NS 101#   | National Service Scheme (NSS)      | 0                       | 0        | 0        | P/NP     | NS 102#   | National Service Scheme (NSS)                  | 0                       | 0        | 0        | P/NP     |
| * D3 & D4 batches, + D1 D2 batches<br># Any one of these three P/NP courses |                                    |                         |          |          |          | * D3 & D4 batches, + D1 D2 batches<br># Any one of these three P/NP courses @ Half semester courses |  |                         |          |          |          |

### Dual Degree : Specialization: Ceramics and Composites( Contd.)

| COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH      |  |                  |     |   |    |  |                                |  |                  |     |   |    |
|--|--|------------------|-----|---|----|--|--------------------------------|--|------------------|-----|---|----|
| Semester III   |  |                  |     |   |    |  | Semester – IV                  |  |                  |     |   |    |
| Course code  | Course Name                                      | Credit Structure |     |   |    |  | Course Code                    | Course Name  | Credit Structure |     |   |    |
|  |  | L                | T   | P | C  |  |                                |  | L                | T   | P | C  |
| MM 201   | Structure of Materials                           | 2                | 1   | 0 | 6  |  | MM 202                         | Thermodynamics of Materials                                      | 2                | 1   | 0 | 6  |
| MM 203   | Mechanics of Materials                           | 2                | 1   | 0 | 6  |  | ME 220                         | Theory of Machines and Machine Design                            | 2                | 1   | 0 | 6  |
| EE 101   | Introduction to Elect. Engineering & Electronics | 3                | 1   | 0 | 8  |  | MM 305                         | Kinetics of Processes  | 2                | 1   | 0 | 6  |
| MM 204   | Transport Phenomena                              | 2                | 1   | 0 | 6  |  | PH 105                         | Modern Physics   | 3                | 1   | 0 | 8  |
|  |  |                  |     |   |    |  |                                |  |                  |     |   |    |
| IC 211   | Exptn. and Meas. Lab.                            | 0                | 0.5 | 3 | 4  |  | EE 209                         | Electrical/ Electronics Lab.                                     | 0                | 0   | 3 | 3  |
|  |  |                  |     |   |    |  | MM 212                         | Metallography and Structural Characterisation Lab.               | 0                | 0.5 | 3 | 4  |
| Total Credits  |  | 9                | 5   | 6 | 30 |  | Total Credits                  |  | 8                | 4   | 3 | 33 |
|  |  |                  |     |   |    |  |                                |  |                  |     |   |    |
| COURSES FOR HONORS REQUIREMENT (Elective from the autumn list) |  |                  |     |   |    |  | COURSES FOR HONORS REQUIREMENT |  |                  |     |   |    |
|  | Honours 1  | 2                | 1   | 0 | 6  |  | MM 206                         | Honours 2<br>Experimental Techniques in Materials Science (Core) | 2                | 1   | 0 | 6  |

**COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH**

[illegible]

## Dual Degree : Specialization: Ceramics and Composites( Contd.)

[illegible]

### Dual Degree : Specialization: Ceramics and Composites ( Contd.)

| <i>COURSE CURRICULUM FOR THE NEW PROGRAMME (Dual Degree.) w.e.f. 2007 BATCH</i> |                     |                  |   |   |    |  |                      |                |                  |   |   |    |
|---|---------------------|------------------|---|---|----|--|----------------------|----------------|------------------|---|---|----|
| Semester IX   |                     |                  |   |   |    |  | Semester – X         |                |                  |   |   |    |
| Course code   | Course Name         | Credit Structure |   |   |    |  | Course Code          | Course Name    | Credit Structure |   |   |    |
|   |                     | L                | T | P | C  |  |                      |                | L                | T | P | C  |
| MM 654  | Advanced Composites | 3                | 0 | 0 | 6  |  |                      | DD Elective II | 3                | 0 | 0 | 6  |
|   | DD Elective I       | 3                | 0 | 0 | 6  |  | MM 594               | DDP Stage II   |                  |   |   | 42 |
| MM 593  | DDP Stage I         |                  |   |   | 30 |  |                      |                |                  |   |   |    |
| <b>Total Credits</b>  |                     |                  |   |   |    |  | <b>Total Credits</b> |                |                  |   |   |    |
| 42  |                     |                  |   |   |    |  | 48                   |                |                  |   |   |    |

## Dual Degree : Specialization: Metallurgical Process Engineering

| <i>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</i> |                                    |                  |   |   |      |   |  |                  |   |   |      |
|--|------------------------------------|------------------|---|---|------|---|--|------------------|---|---|------|
| Semester I   |                                    |                  |   |   |      | Semester – II   |  |                  |   |   |      |
| Course code  | Course Name                        | Credit Structure |   |   |      | Course Code   | Course Name                                    | Credit Structure |   |   |      |
|  |                                    | L                | T | P | C    |   |  | L                | T | P | C    |
| CH 103+<br><b>OR</b><br>PH 103*                                  | Chemistry                          | 2                | 1 | 0 | 6    | CH 103*<br><b>OR</b><br>PH 103+                               | Chemistry                                      | 2                | 1 | 0 | 6    |
|  | Electricity and Magnetism          | 2                | 1 | 0 | 6    |   | Electricity and Magnetism                      | 2                | 1 | 0 | 6    |
| CS 101   | Computer Programming               | 2                | 0 | 2 | 6    | MA 106@<br><b>AND</b><br>MA 108@                              | Linear Algebra and<br>Differential Equations I | 3                | 1 | 0 | 4    |
|  |                                    |                  |   |   |      |   |  | 3                | 1 | 0 | 4    |
| HS 101   | Economics                          | 3                | 0 | 0 | 6    | IC 102  | Data Analysis and Interpretations              | 2                | 1 | 0 | 6    |
| MA 105   | Calculus                           | 3                | 1 | 0 | 8    | MM 152  | Materials and Technology                       | 2                | 1 | 0 | 6    |
|  |                                    |                  |   |   |      |   |  |                  |   |   |      |
|  |                                    |                  |   |   |      |   |  |                  |   |   |      |
| CH 117+<br><b>OR</b><br>PH 117*                                  | Chemistry Lab.                     | 0                | 0 | 3 | 3    | CH 117*<br><b>OR</b><br>PH 117+                               | Chemistry Lab.                                 | 0                | 0 | 3 | 3    |
|  | Physics Lab.                       | 0                | 0 | 3 | 3    |   | Physics Lab.                                   | 0                | 0 | 3 | 3    |
| ME 113+<br><b>OR</b><br>ME 119*                                  | Workshop Practice                  | 0                | 1 | 3 | 5    | ME 113*<br><b>OR</b><br>ME 119+                               | Workshop Practice                              | 0                | 1 | 3 | 5    |
|  | Engineering Graphics and Drawing   | 1                | 0 | 3 | 5    |   | Engineering Graphics and Drawing               | 1                | 0 | 3 | 5    |
|  |                                    |                  |   |   |      |   |  |                  |   |   |      |
|  |                                    |                  |   |   |      |   |  |                  |   |   |      |
| NC 101#  | National Cadet Corps (NCC)         | 0                | 0 | 0 | P/NP | NC 102#   | National Cadet Corps (NCC)                     | 0                | 0 | 0 | P/NP |
| NO 101#  | National Sports Organization (NSO) | 0                | 0 | 0 | P/NP | NC 102#   | National Sports Organization (NSO)             | 0                | 0 | 0 | P/NP |
| NS 101#  | National Service Scheme (NSS)      | 0                | 0 | 0 | P/NP | NS 102#   | National Service Scheme (NSS)                  | 0                | 0 | 0 | P/NP |
| * D3 & D4 batches, + D1 D2 batches                               |                                    |                  |   |   |      | * D3 & D4 batches, + D1 D2 batches                            |  |                  |   |   |      |
| # Any one of these three P/NP courses                            |                                    |                  |   |   |      | # Any one of these three P/NP courses @ Half semester courses |  |                  |   |   |      |

**Dual Degree : Specialization: Metallurgical Process Engineering( Contd.)**

| <b>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</b> |  |                         |          |          |           |                                |  |                         |          |          |           |
|--|--|-------------------------|----------|----------|-----------|--------------------------------|--|-------------------------|----------|----------|-----------|
| <b>Semester III</b>  |  |                         |          |          |           | <b>Semester – IV</b>           |  |                         |          |          |           |
| <b>Course code</b>   | <b>Course Name</b>                                   | <b>Credit Structure</b> |          |          |           | <b>Course Code</b>             | <b>Course Name</b>   | <b>Credit Structure</b> |          |          |           |
|  |  | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |                                |  | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |
| MM 201   | Structure of Materials                               | 2                       | 1        | 0        | 6         | MM 202                         | Thermodynamics of Materials                                      | 2                       | 1        | 0        | 6         |
| MM 203   | Mechanics of Materials                               | 2                       | 1        | 0        | 6         | ME 220                         | Theory of Machines and Machine Design                            | 2                       | 1        | 0        | 6         |
| EE 101   | Introduction to Electrical Engineering & Electronics | 3                       | 1        | 0        | 8         | MM 305                         | Transport Phenomena  | 2                       | 1        | 0        | 6         |
| MM 204   | Transport Phenomena                                  | 2                       | 1        | 0        | 6         | PH 105                         | Modern Physics   | 3                       | 1        | 0        | 8         |
|  |  |                         |          |          |           |                                |  |                         |          |          |           |
| IC 211   | Exptn. and Meas. Lab                                 | 0                       | 0.5      | 3        | 4         | EE 209                         | Electrical/ Electronics Lab.                                     | 0                       | 0        | 3        | 3         |
|  |  |                         |          |          |           | MM 212                         | Metallography and Structural Characterization Lab.               | 0                       | 0.5      | 3        | 4         |
| <b>Total Credits</b>   |  | <b>9</b>                | <b>5</b> | <b>6</b> | <b>30</b> | <b>Total Credits</b>           |  | <b>8</b>                | <b>4</b> | <b>3</b> | <b>33</b> |
|  |  |                         |          |          |           |                                |  |                         |          |          |           |
| COURSES FOR HONORS REQUIREMENT (Elective from the autumn list)   |  |                         |          |          |           | COURSES FOR HONORS REQUIREMENT |  |                         |          |          |           |
|  | Honours 1  | 2                       | 1        | 0        | 6         | MM 206                         | Honours 2<br>Experimental Techniques in Materials Science (Core) | 2                       | 1        | 0        | 6         |

## Dual Degree : Specialization: Metallurgical Process Engineering( Contd.)

[illegible]



**Dual Degree : Specialization: Metallurgical Process Engineering( Contd.)**

[illegible]

**Dual Degree : Specialization: Metallurgical Process Engineering (Contd.)**

| COURSE CURRICULUM FOR THE NEW PROGRAMME (Dual Degree.) w.e.f. 2007 BATCH |                   |                  |   |   |    |  |               |                |                  |   |   |    |
|--|-------------------|------------------|---|---|----|--|---------------|----------------|------------------|---|---|----|
| Semester IX  |                   |                  |   |   |    |  | Semester – X  |                |                  |   |   |    |
| Course code  | Course Name       | Credit Structure |   |   |    |  | Course Code   | Course Name    | Credit Structure |   |   |    |
|  |                   | L                | T | P | C  |  |               |                | L                | T | P | C  |
| MM 452   | Plant Engineering | 3                | 0 | 0 | 6  |  |               | DD Elective II | 3                | 0 | 0 | 6  |
|  | DD Elective I     | 3                | 0 | 0 | 6  |  | MM 594        | DDP Stage II   |                  |   |   | 42 |
| MM 593   | DDP Stage I       |                  |   |   | 30 |  |               |                |                  |   |   |    |
| Total Credits  |                   |                  |   |   |    |  | Total Credits |                |                  |   |   |    |
| 42   |                   |                  |   |   |    |  | 48            |                |                  |   |   |    |

**LIST OF DD ELECTIVES**

| Autumn Semester (July-December) |  |                  |   |   |   | Spring Semester (January-June) |  |                  |   |   |   |
|---------------------------------|--|------------------|---|---|---|--------------------------------|--|------------------|---|---|---|
| Course code                     | Course Name                                      | Credit Structure |   |   |   | Course Code                    | Course Name                                      | Credit Structure |   |   |   |
|                                 |  | L                | T | P | C |                                |  | L                | T | P | C |
| MM 655                          | Modeling and Analysis                            | 3                | 0 | 0 | 6 | MM 622                         | Advanced Concepts in Iron Making                 | 2                | 0 | 0 | 4 |
| MM 657                          | Design and Application of Engg. Materials        | 3                | 0 | 0 | 6 | MM 624                         | Advanced Concepts in Steel Making                | 2                | 0 | 0 | 4 |
| MM 669                          | Mechanical Behaviour of Thin Films               | 3                | 0 | 0 | 6 | MM 626                         | Thermomechanical Processing and Forming of Steel | 3                | 0 | 0 | 6 |
| MM 677                          | Diffusion and Kinetics                           | 3                | 0 | 0 | 6 | MM 630                         | Mineral Process Engineering                      | 3                | 0 | 0 | 6 |
| MM 680                          | Welding Science and Technology                   | 3                | 0 | 0 | 6 | MM 632                         | Surface Engineering                              | 3                | 0 | 0 | 6 |
| MM 681                          | Plastic Deformation and Microstructure Evolution |                  |   |   |   | MM 656                         | Simulation and Optimization                      | 3                | 0 | 0 | 6 |
| MM 685                          | Electrical and Magnetic Materials                | 3                | 0 | 0 | 6 | MM 638                         | Polymer Blends and Composites                    | 3                | 0 | 0 | 6 |
| MM 687                          | Surface Science and Engineering                  |                  |   |   |   | MM 652                         | Advanced Ceramics                                | 3                | 0 | 0 | 6 |
| MM 691                          | Topics in Phase Transformation                   | 3                | 0 | 0 | 6 | MM 654                         | Advanced Composites                              | 3                | 0 | 0 | 6 |
| EE 665                          | IC Technology                                    | 3                | 0 | 0 | 6 | MM 658                         | Fracture Mechanics and Failure Analysis          | 3                | 0 | 0 | 6 |
| ME 613                          | Finite Element Methods                           | 3                | 0 | 0 | 6 | MM 668                         | Computational Methods for Metal Forming Analysis | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 670                         | Powders and Sintered Products                    | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 672                         | Solidification Processing                        | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 674                         | Materials & Processes for Semiconductor Devices  | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 676                         | Superconductivity Materials & Applications       | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 678                         | Magnetism and Magnetic Materials                 | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 682                         | Grain Boundaries and Interfaces                  | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | MM 684                         | X-Ray Diff. and Elec. Microscopy                 | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   |                                |  |                  |   |   |   |
|                                 |  |                  |   |   |   | MM 688                         | Non-Crystalline Materials                        | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | CE 620                         | Finite Element Method                            | 3                | 0 | 0 | 6 |
|                                 |  |                  |   |   |   | CH 602                         | Characterisation of Polymers                     | 3                | 0 | 0 | 6 |

**DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**  
**For 2007 batch on B.Tech./ DD (To accommodate HSS courses in V Semester)**

| <b>COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH</b> |   |                         |          |          |           |                                |   |                         |          |          |           |
|--|---|-------------------------|----------|----------|-----------|--------------------------------|---|-------------------------|----------|----------|-----------|
| <b>Semester III</b>  |   |                         |          |          |           | <b>Semester – IV</b>           |   |                         |          |          |           |
| <b>Course code</b>   | <b>Course Name</b>                        | <b>Credit Structure</b> |          |          |           | <b>Course Code</b>             | <b>Course Name</b>                                  | <b>Credit Structure</b> |          |          |           |
|  |   | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |                                |   | <b>L</b>                | <b>T</b> | <b>P</b> | <b>C</b>  |
| MM 201   | Structure of Materials                    | 2                       | 1        | 0        | 6         | MM 202                         | Thermodynamics of Materials                         | 2                       | 1        | 0        | 6         |
| MM 203   | Mechanics of Materials                    | 2                       | 1        | 0        | 6         | ME 220                         | Theory of Machines and Machine Design               | 2                       | 1        | 0        | 6         |
|  |   |                         |          |          |           | MM 305                         | Kinetics of Processes                               | 2                       | 1        | 0        | 6         |
| EE 201   | Intro. to Electrical Engg. & Electronics  | 3                       | 1        | 0        | 8         | PH 105                         | Modern Physics                                      | 3                       | 1        | 0        | 8         |
| MM 204   | Transport Phenomena                       | 2                       | 1        | 0        | 6         | EE 2XX                         | Electrical/ Electronics Lab.                        | 0                       | 0        | 3        | 3         |
|  |   |                         |          |          |           |                                |   |                         |          |          |           |
| IC 215   | Exptn. and Meas. Lab                      | 0                       | 0.5      | 3        | 4         | MM 212                         | Metallography and Structural Characterisation Lab.  | 0                       | 0.5      | 3        | 4         |
| <b>Total</b>   |   | <b>9</b>                | <b>5</b> | <b>6</b> | <b>30</b> | <b>Total</b>                   |   | <b>8</b>                | <b>4</b> | <b>3</b> | <b>33</b> |
| COURSES FOR HONORS REQUIREMENT (Elective from the autumn list)   |   |                         |          |          |           | COURSES FOR HONORS REQUIREMENT |   |                         |          |          |           |
| MM 409   | Colloid and Interface Science (suggested) | 2                       | 1        | 0        | 6         | MM 206                         | Experimental Techniques in Materials Science (Core) | 2                       | 1        | 0        | 6         |
|  |   |                         |          |          |           |                                |   |                         |          |          |           |
| COURSES FOR MINOR REQUIREMENT                                    |   |                         |          |          |           | COURSES FOR MINOR REQUIREMENT  |   |                         |          |          |           |
| MM 202   | Thermodynamics of Materials (Core)        | 2                       | 1        | 0        | 6         | MM 201                         | Structure of Materials (Core)                       | 2                       | 1        | 0        | 6         |

**DEPARTMENT OF METALLURGICAL ENGINEERING AND MATERIALS SCIENCE**  
**For 2007 batch on B.Tech./ DD (To accommodate HSS courses in V Semester)**

| COURSE CURRICULUM FOR THE NEW PROGRAMME w.e.f. 2007 BATCH |  |                  |     |     |      |                                |  |                  |   |     |     |
|---|--|------------------|-----|-----|------|--------------------------------|--|------------------|---|-----|-----|
| Semester V  |  |                  |     |     |      | Semester – VI                  |  |                  |   |     |     |
| Course code   | Course Name  | Credit Structure |     |     |      | Course Code                    | Course Name  | Credit Structure |   |     |     |
|   |  | L                | T   | P   | C    |                                |  | L                | T | P   | C   |
| MM 301  | Ceramics and Powder Metallurgy   | 2                | 1   | 0   | 6    | MM 302                         | Electronic Properties of Materials.  | 2                | 1 | 0   | 6   |
| MM 303  | Phase Transformations  | 2                | 1   | 0   | 6    | MM 304                         | Metal Casting and Joining  | 2                | 1 | 0   | 6   |
| HS202 OR  | Introduction to Philosophy   | 3                | 0   | 0   | 6    | MM 306                         | Process Metallurgy Principles  | 2                | 1 | 0   | 6   |
| HS203 OR  | Introduction to Psychology   | 3                | 0   | 0   | 6    |                                |  |                  |   |     |     |
| HS204 OR  | Introduction to Literature   | 3                | 0   | 0   | 6    |                                |  |                  |   |     |     |
| HS205   | Introduction to Sociology  | 3                | 0   | 0   | 6    |                                |  |                  |   |     |     |
| MM 307  | Mechanical Behaviour of Materials  | 2                | 1   | 0   | 6    | MA 214                         | Introduction to Numerical Analysis   | 3                | 1 | 0   | 8   |
|   |  |                  |     |     |      |                                |  |                  |   |     |     |
| MM 311  | Heat Treatment Lab.  | 0                | 1   | 3   | 5    | MM 312                         | Casting and Joining Lab.   | 0                | 0 | 1.5 | 1.5 |
| MM 313  | Mech. Testing Lab.   | 0                | 0.5 | 1.5 | 2.5  | MM 314                         | Manufacturing Processes Lab.   | 0                | 0 | 1.5 | 1.5 |
|   |  |                  |     |     |      | MM 314s                        | Seminar (3 Credits)  | 0                | 0 | 3   | 3   |
|   |  |                  |     |     |      |                                |  |                  |   |     |     |
|   |  |                  |     |     |      |                                |  |                  |   |     |     |
| Total Credits   |  |                  |     |     | 31.5 | Total Credits                  |  |                  |   |     | 32  |
| COURSES FOR HONORS REQUIREMENT                            |  |                  |     |     |      | COURSES FOR HONORS REQUIREMENT |  |                  |   |     |     |
|   | Elective from the autumn sem. list   |                  |     |     |      |                                | Elective from the spring sem. List or BTP I (6 credits)                              |                  |   |     |     |
|   |  |                  |     |     |      |                                |  |                  |   |     |     |
| COURSES FOR MINOR REQUIREMENT                             |  |                  |     |     |      | COURSES FOR MINOR REQUIREMENT  |  |                  |   |     |     |
| MM 302  | Electronic Properties of Materials (Core)<br>Prerequisite: MM 201: Structure of Materials<br>(Not available for EP, they can take any<br>elective from list) | 2                | 1   | 0   | 6    | MM 303                         | Phase Transformations (Core)<br>Prerequisite: MM 202: Thermodynamics of<br>Materials | 2                | 1 | 0   | 6   |