

13. Courses of Study and Scheme of Assessment

BE METALLURGICAL ENGINEERING

(2015 REGULATIONS)
(Minimum credits to be earned: 185)

| Code No. | Course | Hours / week | | | Credits | Maximum marks | | | | |
|--------------------------------|---------------------------------------|--------------|----------|--------------------------|-----------|---------------|------------|-------------|-----|----|
| | | Lecture | Tutorial | Practical | | CA | FE | Total | CAT | |
| SEMESTER I | | | | | | | | | | |
| 15Y101 | Calculus and its Applications | 3 | 2 | 0 | 4 | 50 | 50 | 100 | BS | |
| 15Y102 | Physics | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y103 | Chemistry | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y104 | Problem Solving and C Programming | 2 | 2 | 0 | 3 | 50 | 50 | 100 | ES | |
| 15Y105 | Mineral Beneficiation | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC | |
| 15C104 | English Language Proficiency | 2 | 2 | 0 | 3 | 50 | 50 | 100 | HS | |
| 15Y110 | Engineering Graphics | 1 | 0 | 4 | 3 | 100 | - | 100 | ES | |
| 15Y111 | Physics Laboratory I | 0 | 0 | 2 | 1 | 100 | - | 100 | BS | |
| 15Y112 | Chemistry Laboratory I | 0 | 0 | 2 | 1 | 100 | - | 100 | BS | |
| 15Y214 | Personality and Character Development | 0 | 0 | Refer Sem 2 and footnote | | | | | | MC |
| Total 31 hrs | | 17 | 6 | 8 | 24 | 600 | 300 | 900 | | |
| SEMESTER II | | | | | | | | | | |
| 15Y201 | Complex Variables and Transforms | 3 | 2 | 0 | 4 | 50 | 50 | 100 | BS | |
| 15Y202 | Materials Science | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y203 | Applied Chemistry | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y204 | Fluid Mechanics and Heat Transfer | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES | |
| 15Y205 | Applied Mechanics | 4 | 0 | 0 | 4 | 50 | 50 | 100 | ES | |
| 15_____ | Language Elective | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS | |
| 15Y210 | Fuels and Mineral Dressing Laboratory | 0 | 0 | 2 | 1 | 100 | - | 100 | PC | |
| 15Y211 | Physics Laboratory II | 0 | 0 | 2 | 1 | 100 | - | 100 | BS | |
| 15Y212 | Chemistry Laboratory II | 0 | 0 | 2 | 1 | 100 | - | 100 | BS | |
| 15Y213 | Engineering Practices | 0 | 0 | 2 | 1 | 100 | - | 100 | ES | |
| 15Y214 | Personality and Character Development | 0 | 0 | ** | Grade | - | - | - | MC | |
| Total 29 hrs | | 19 | 2 | 8 | 24 | 700 | 300 | 1000 | | |
| Summer Term[€] | | | | | | | | | | |
| 15Y215 | Professional Skills | 6 | 0 | 9 | 2 | 100 | - | 100 | EEC | |
| 15Y216 | In-Plant Training & Technical Seminar | 6 | 0 | 9 | 2 | 100 | - | 100 | EEC | |
| Total 30 hrs | | 12 | 0 | 18 | 4 | 200 | - | 200 | | |

CA - Continuous Assessment

FE - Final Examination

€ - These courses will be conducted prior to the commencement of the third semester for a period of 4 weeks during summer term.

CAT-Category; BS – Basic Science; HS – Humanities & Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; OE – Open Elective; EEC – Employability Enhancement Course

BE METALLURGICAL ENGINEERING**(2015 REGULATIONS)**

| Code No. | Course | Hours / week | | | | Credits | Maximum marks | | | |
|---------------------|---|--------------|----------|-----------|----|---------|---------------|-------|-----|--|
| | | Lecture | Tutorial | Practical | CA | | FE | Total | CAT | |
| SEMESTER III | | | | | | | | | | |
| 15Y301 | Numerical Methods | 2 | 2 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y302 | Design of Machine Elements | 3 | 2 | 0 | 4 | 50 | 50 | 100 | ES | |
| 15Y303 | Basics of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES | |
| 15Y304 | Elements of Physical Metallurgy | 4 | 0 | 0 | 4 | 50 | 50 | 100 | PC | |
| 15Y305 | Metallurgical Thermodynamics | 2 | 2 | 0 | 3 | 50 | 50 | 100 | PC | |
| 15C070 | Economics for Engineers | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS | |
| 15Y310 | Metallography Laboratory I | 0 | 0 | 4 | 2 | 100 | - | 100 | PC | |
| 15Y311 | Metal Cutting Practices Laboratory | 0 | 0 | 2 | 1 | 100 | - | 100 | ES | |
| 15Y312 | Electrical and Electronics Engineering Laboratory | 0 | 0 | 2 | 1 | 100 | - | 100 | ES | |
| Total 31 hrs | | 17 | 6 | 8 | 24 | 600 | 300 | 900 | | |
| SEMESTER IV | | | | | | | | | | |
| 15Y401 | Probability and Statistics | 2 | 2 | 0 | 3 | 50 | 50 | 100 | BS | |
| 15Y402 | Environmental Science and Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES | |
| 15Y403 | Mechanical Behavior and Testing of Materials | 2 | 2 | 0 | 3 | 50 | 50 | 100 | PC | |
| 15Y404 | Non Ferrous Extraction Metallurgy | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC | |
| 15Y405 | Production of Iron | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC | |
| 15_____ | Open Elective I* | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE | |
| 15Y410 | Metallography Laboratory II | 0 | 0 | 4 | 2 | 100 | - | 100 | PC | |
| 15Y411 | Materials Testing and CIM Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC | |
| 15Y412 | Industrial Visit Cum Lecture | 0 | 0 | 4 | 2 | 100 | - | 100 | EEC | |
| Total 32 hrs | | 16 | 4 | 12 | 24 | 600 | 300 | 900 | | |

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* – LTPC for open electives can be either 3 0 0 3 or 2 2 0 3.

BE METALLURGICAL ENGINEERING**(2015 REGULATIONS)**

| Code No. | Course | Hours / week | | | | Maximum marks | | | |
|---------------------|---|--------------|----------|-----------|-----------|---------------|------------|------------|-----|
| | | Lecture | Tutorial | Practical | Credits | CA | FE | Total | CAT |
| SEMESTER V | | | | | | | | | |
| 15Y501 | Physical Metallurgy | 3 | 2 | 0 | 4 | 50 | 50 | 100 | PC |
| 15Y502 | Production of Steel | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y503 | Metal Casting | 2 | 2 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y504 | Powder Metallurgy | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y505 | Heat Treatment and Surface Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15____ | Open Elective II* | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE |
| 15Y510 | Foundry and Powder Metallurgy Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC |
| 15Y511 | Heat Treatment and Surface Engineering Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC |
| 15Y512 | Technical Seminar | 0 | 0 | 2 | 1 | 100 | - | 100 | EEC |
| Total 31 hrs | | 17 | 4 | 10 | 24 | 600 | 300 | 900 | |
| SEMESTER VI | | | | | | | | | |
| 15Y601 | Materials Characterization | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y602 | Metal Forming | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y603 | Metal Joining | 2 | 2 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y604 | Ceramics and Composites | 2 | 2 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y____ | Professional Elective I | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15____ | Open Elective III* | 3 | 0 | 0 | 3 | 50 | 50 | 100 | OE |
| 15Y610 | Materials Characterization Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC |
| 15Y611 | Welding and Forming Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC |
| 15Y612 | Innovation Practices and Comprehensive Viva-Voce | 0 | 0 | 4 | 2 | 100 | - | 100 | EEC |
| Total 32 hrs | | 16 | 4 | 12 | 24 | 600 | 300 | 900 | |

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* – LTPC for open electives can be either 3 0 0 3 or 2 2 0 3.

BE METALLURGICAL ENGINEERING**(2015 REGULATIONS)**

| Code No. | Course | Hours / week | | | | Maximum marks | | | |
|---------------------|---|--------------|----------|-----------|-----------|---------------|------------|------------|-----|
| | | Lecture | Tutorial | Practical | Credits | CA | FE | Total | CAT |
| SEMESTER VII | | | | | | | | | |
| 15Y701 | Kinetics in Metallurgical Processes | 3 | 2 | 0 | 4 | 50 | 50 | 100 | PC |
| 15Y702 | Nondestructive Testing | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y703 | Corrosion Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 15Y___ | Professional Elective II | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15Y___ | Professional Elective III | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15Y___ | Professional Elective IV | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15Y710 | Corrosion and Nondestructive Testing Laboratory | 0 | 0 | 4 | 2 | 100 | - | 100 | PC |
| 15Y720 | Project Work I | 0 | 0 | 4 | 2 | 100 | - | 100 | EEC |
| Total 28 hrs | | 18 | 2 | 8 | 23 | 600 | 300 | 900 | |

SEMESTER VIII

| | | | | | | | | | |
|---------------------|--------------------------|----------|----------|-----------|-----------|------------|------------|------------|-----|
| 15Y___ | Professional Elective V | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15Y___ | Professional Elective VI | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| 15Y820 | Project Work II | 0 | 0 | 16 | 8 | 50 | 50 | 100 | EEC |
| Total 22 hrs | | 6 | 0 | 16 | 14 | 150 | 150 | 300 | |

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LANGUAGE ELECTIVES

| | |
|--------|------------------------------------|
| 15C080 | Communication Skills for Engineers |
| 15C081 | Basic German |
| 15C082 | Basic French |
| 15C083 | Basic Japanese |

OPEN ELECTIVES

(Students can opt for all open electives from single stream or several streams)

MATHEMATICS

| | |
|--------|--|
| 15OH01 | Advanced Linear Algebra |
| 15OH02 | Algebraic Structures |
| 15OH03 | Calculus of Variations and Tensor Analysis |
| 15OH04 | Graph Theory and its Applications |
| 15OH05 | Mathematical Finance |
| 15OH06 | Mathematical Modeling and Simulation |
| 15OH07 | Number Theory for Computing |
| 15OH08 | Operations Research |
| 15OH09 | Reliability and Quality Control |
| 15OH10 | Soft Computing |
| 15OH11 | Stochastic Models |

PHYSICS

| | |
|--------|---|
| 15OH20 | Analytical Techniques for Materials Characterization |
| 15OH21 | Laser Technology |
| 15OH22 | Micro Electromechanical Systems |
| 15OH23 | Nanomaterials and Applications |
| 15OH24 | Physics for Solar PV Systems and Solid-State Lighting Systems |
| 15OH25 | Sensors for Engineering Applications |
| 15OH26 | Thin Film Technology |
| 15OH27 | Nonlinear Science and Engineering Applications |
| 15OH28 | Nonlinear Fiber Optics |
| 15OH29 | Chaotronics |

CHEMISTRY

| | |
|--------|---------------------------------------|
| 15OH37 | Energy Storing Devices and Fuel Cells |
| 15OH41 | Polymer Science and Technology |

COMPUTER APPLICATIONS

| | |
|--------|---------------------------------------|
| 15OH46 | Computer Graphics and Virtual Reality |
| 15OH47 | Data and File Structures |
| 15OH48 | Database Management System |
| 15OH49 | High Performance Computing |
| 15OH50 | Mainframe Systems |
| 15OH51 | Mobile Application Development |
| 15OH52 | Multicore Programming |
| 15OH53 | Object Oriented Programming |
| 15OH54 | Programming in Python |
| 15OH55 | Responsive Web Design |
| 15OH56 | Social Web Mining |
| 15OH57 | Software Engineering |
| 15OH58 | Java Programming |
| 15OH59 | Geographic Information System |
| 15OH60 | Programming for Robotics |

HUMANITIES

| | |
|--------|--|
| 15OH61 | An Introduction to Indian Constitution |
| 15OH62 | Entrepreneurship |
| 15OH63 | Human Resource Management |
| 15OH64 | Industrial Psychology |

| | |
|--------|---|
| 15OH65 | Principles of Management |
| 15OH66 | Business Statistics |
| 15OH67 | Disaster Management |
| 15OH68 | Financial and Managerial Accounting |
| 15OH69 | Marketing Management |
| 15OH70 | Defence Practices and Disaster Management |

ENGLISH

| | |
|--------|--|
| 15OH75 | English and Soft Skills for Employability |
| 15OH76 | English for Competitive Examinations |
| 15OH77 | German Language – International Level A1.1 |
| 15OH78 | German Language – International Level A1.2 |

APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCES

| | |
|--------|------------------------------------|
| 15OH81 | Data Structures and Algorithms |
| 15OH82 | Optimization Techniques |
| 15OH83 | Data Science |
| 15OH84 | Data Visualization |
| 15OH85 | Artificial Intelligence |
| 15OH86 | Pervasive Computing |
| 15OH87 | Parallel and Distributed Computing |
| 15OH88 | Cyber Security |
| 15OH89 | Randomized Algorithms |
| 15OH90 | Approximation Algorithms |
| 15OH91 | Network Science |
| 15OH92 | Applied Stochastic Processes |
| 15OH93 | Modelling and Simulation |
| 15OH94 | Graph Algorithms |

PROFESSIONAL ELECTIVES

| | |
|--------|--|
| 15Y001 | Phase Transformations |
| 15Y002 | Mass and Heat Balance in Metallurgy |
| 15Y003 | Creep and Fatigue |
| 15Y004 | Special Forming Processes |
| 15Y005 | Fracture Mechanics and Failure Analysis |
| 15Y006 | Metallurgy of Castings |
| 15Y007 | Special Casting Techniques |
| 15Y008 | Welding Procedures and Qualifications |
| 15Y009 | Advanced Surface Engineering |
| 15Y010 | Selection of Materials |
| 15Y011 | Metallurgy of Tool Materials |
| 15Y012 | Metallurgy of Steels and Non Ferrous Alloys |
| 15Y013 | Structure and Properties of Polymers |
| 15Y014 | Nano Materials Technology |
| 15Y015 | Computations in Metallurgical Engineering |
| 15Y016 | Additive Manufacturing |
| 15Y017 | Mathematical Modeling in Metallurgical Engineering |
| 15Y018 | Atomistic Modeling of Materials |
| 15Y019 | Computational Thermodynamics |
| 15Y020 | Modern Trends in usage of Steels |

OPEN ELECTIVES OFFERED BY ENGINEERING DEPARTMENTS

| | | |
|--------|---------------------------------------|-----------------------------------|
| 15AH06 | Motor Vehicle Engineering | (Dept. of Automobile Engineering) |
| 15MH02 | Total Quality Management | (Dept. of Mechanical Engineering) |
| 15MH03 | Industrial Engineering and Management | (Dept. of Mechanical Engineering) |
| 15MH05 | Six Sigma Project Methodology | (Dept. of Mechanical Engineering) |

ONE CREDIT COURSES

OFFERED BY THE DEPARTMENT OF METALLURGY

| | |
|--------|--|
| 15YF01 | Corrosion of Metals & Alloys: Industrial Preliminaries |
| 15YF02 | Welding Application Technology |
| 15YF03 | Application of Nondestructive Testing in Manufacturing |
| 15YF04 | Blast Furnace Design and Cast House Practice |

OFFERED BY THE DEPARTMENT OF HUMANITIES

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|--------|--|
| 15OF01 | Export – Import Management |
| 15OF02 | Insurance & Risk Management |
| 15OF03 | Values and Ethics at Work Place |
| 15OF04 | Development of Industrialisation |
| 15OF05 | Creativity and Social Enterprise |
| 15OF06 | Social and Psychological Well Being |
| 15OF13 | Security Analysis and Portfolio Management |
| 15OF14 | Implementation of Quality Management System |
| 15OF15 | Financial Management |
| 15OF16 | Personality Development Through Transactional Analysis |

OFFERED BY THE DEPARTMENT OF ENGLISH

| | |
|--------|--|
| 15OF10 | Corporate Communication |
| 15OF11 | Interpersonal and Organizational Communication |
| 15OF12 | Human Values Through Literature |

OFFERED BY THE DEPARTMENT OF MATHEMATICS

| | |
|--------|----------------------------------|
| 15OF21 | Principles of Business Analytics |
|--------|----------------------------------|

SUMMARY OF CREDIT DISTRIBUTION TABLE

| B.E. METALLURGICAL ENGINEERING | | | | | | | | | | | | |
|--------------------------------|--------------------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|--------------|------------|
| S. No | Course Work subject Area | Credits Per Semester | | | | | | | | Total Credit | Credit Range | |
| | | I | II | III | IV | V | VI | VII | VIII | | Min | Max |
| 1 | HS | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 18 |
| 2 | BS | 12 | 12 | 3 | 3 | 0 | 0 | 0 | 0 | 30 | 27 | 36 |
| 3 | ES | 6 | 8 | 9 | 3 | 0 | 0 | 0 | 0 | 26 | 27 | 36 |
| 4 | PC | 3 | 1 | 9 | 13 | 20 | 16 | 12 | 0 | 74 | 54 | 72 |
| 5 | PE | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 6 | 18 | 18 | 27 |
| 6 | OE | 0 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 9 | 9 | 18 |
| 7 | EEC | 0 | 4 | 0 | 2 | 1 | 2 | 2 | 8 | 19 | 18 | 27 |
| | Total | 24 | 28 | 24 | 24 | 24 | 24 | 23 | 14 | 185 | 175 | 185 |

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