

# **Gautam Buddha University, Greater Noida**

## **School of Engineering (Mechanical Engineering)**

<b>Degree</b>	<b>Course Name</b>	<b>Course Code</b>	<b>Marks:100</b>
M. Tech. (Manufacturing)	Thermo-fabrication Processes	MEM 513	SM+MT+ET 25+25+50
<b>Semester</b>	<b>Credits</b>	<b>L-T-P</b>	<b>Exam.</b>
I	3	3-0-0	3 Hours

### **Unit - I**

**Design of Casting and Quality Control:** Introduction to casting and features of casting problems; Factors to be considered in casting design; Design considerations in pattern making; Moulding techniques; Core making and assembly; Cooling stresses and hot spots in casting and modification in casting geometry to overcome them; Casting quality control-casting defects and factors responsible for them; Different inspection and testing methods to evaluate the casting; Quality control activities in a foundry; Salvaging methods of defective casting.

**(08 Hours)**

### **Unit - II**

**Principles of Gating and Riser:** Purpose of the gating system; Components of gating system and its functions; Design of gating system; Types of gates; Gating ratio and its functions; Effects of gates on aspiration; Turbulence and dross trap; recent trends; Functions; Types and applications of the riser; Use of insulating material and exothermic compounds in risers; Riser design; Riser curves; NRL method of riser design; Feeding distance; Riser design of complex casting; Riser design of alloys other than steel; Riser design by geometrical programming.

**(10 Hours)**

### **Unit - III**

**Welding Metallurgy:** Welding as compared with other fabrication processes; Classification of welding processes; Heat affected zone and its characteristics; Effects of alloying elements on weldability; Weldability of steels; Stainless steel;

cast iron; and aluminum and titanium alloys; Weld testing standards; Hydrogen embrittlement; Lammellar tearing; Residual stresses and its measurement; Heat transfer and solidification; Analysis of stresses in welded structures; Pre and post welding heat treatments; Metallurgical aspects of joining; Conditions of soldering; Brazing and welding of materials. **(10 Hours)**

#### **Unit - IV**

**Weld Design & Quality Control:** Principles of sound weld design; Welding joint design; Welding defects; Testing of weldament; Material joining characteristics; Welding positions; Allowable strength of welds under steady loads; Weld throat thickness; Weld quality; Discontinuities in welds; their causes and remedies and quality conflicts. **(07 Hours)**

#### **Unit - V**

**Modern Trends in Welding:** Friction welding; Explosive welding; Diffusion bonding; High frequency induction welding; Ultrasonic welding; Electron beam welding; Plasma arc welding; LASER welding. **(05 Hours)**

#### **Unit - VI**

**Inspection and Testing of Welding and Casting:** Defects; Destructive tests; Non destructive testing techniques; Surface treatments-safety aspects in welding processes; Specific welding applications and innovations. **(05 Hours)**

#### **Recommended Books:**

1. Casting Technology and Cast Alloys; Chakraborty; Prentice Hall of India
2. Metal Casting: Principles and Practice; T. V. Rammana Rao; New Age International.
3. Principles of Metal Casting; R. W. Heine; C. R. Loper; P. C. Rosenthal; 2nd Edition; Tata McGraw Hill Publishers; 1985.
4. Welding Processes and Technology; R. S. Parmar; Khanna Publishers.
5. Foundries Practice (Vol. I and II); Titov Stepanov.
6. Foundry Technology; P.R. Beelely Butterworth.
7. Advanced Welding Processes; Nikodaco & Shansky; MIR Publications
8. Welding Technology and Design; V. M. Radhakrishnan; New Age International.
9. Advanced Welding Systems; Vol. I, II and III; J. Cornu Jaico Publishers.