



**BHARTIYA SKILL DEVELOPMENT UNIVERSITY**  
**SCHOOL OF MANUFACTURING SKILLS**  
**5<sup>th</sup> SEMESTER, FIRST IN-SEM. EXAMINATION**  
**WINTER SEMESTER, B.VOC. PROGRAM**  
**SESSION 2018-2019**

**Course Code: SMS1506**  
**Time (Minutes): 60**

**Course Name: Project Preparation**  
**Maximum Marks: 20**

**Instruction:**

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 05 Questions. Each question carries 1 Mark.
4. Section B contains 03 Questions. Each question carries 2 Marks.
5. Section C contains 03 Questions. Each question carries 3 Marks.

**Section- A**

1. What is S235 in S235JRC+C material designation.
  - a) Additional Symbol for Steel products
  - b) Main Symbol
  - c) Additional Symbol
  - d) Main symbol for cast iron
2. Steel is a material:
  - a) whose main component is steel that generally have a carbon percentage of less than 1%.
  - b) whose main component is iron that generally have a carbon percentage of less than 1%.
  - c) whose main component is steel that generally have a carbon percentage of less than 2%.
  - d) whose main component is iron that generally have a carbon percentage of less than 2%.
3. Refining of PIG iron to steel:
  - a) Reduces carbon content
  - b) Eliminate undesired substances
  - c) None of the above
  - d) Both a & b
4. \_\_\_\_\_ is the heavy metal (density > 5kg/dm<sup>3</sup>)
  - a) Aluminum
  - b) Magnesium
  - c) Copper
  - d) Titanium



5. Which is not a Natural material?
- Ceramics
  - Granite
  - Graphite
  - Wood

**Section B**

- What is PIG Iron?
- What is meant by the term "Refining"?
- Define Linear thermal expansion.

**Section C**

- Explain basic oxygen process in production of Steel.
- Explain the following.
  - Designation of S235 JRC+C according to the properties.

| Use                                     | Main symbols (examples) | Use                    | Main symbols (examples) |
|---|-------------------------|------------------------|-------------------------|
| Reinforcing steels                      | B 500 <sup>1)</sup>     | Pressure vessel steels | P 265 <sup>2)</sup>     |
| Flat products for cold forming          | D X52 <sup>2)</sup>     | Rail steels            | R 260 <sup>2)</sup>     |
| Engineering steels                      | E 360 <sup>1)</sup>     | Structural steels      | S 235 <sup>1)</sup>     |
| Flat products from high strength steels | H C400 <sup>2)</sup>    | Tinmill products       | T S550 <sup>3)</sup>    |
| Linepipe steels                         | L 360 <sup>1)</sup>     | Prestraining steels    | Y 1,770 <sup>2)</sup>   |

| Mechanical or physical properties |      |                  |  |
|-----------------------------------|------|------------------|--|
| Group 1                           |      |                  | Group 2                                      |
| Notch toughness in joules         |      | Test temp. in °C | A Precipitation-hardened                     |
| 27 J                              | 40 J | 60 J             | M Thermo-mechanically rolled                 |
| JR                                | KR   | LR               | N Normalising annealed or normalising rolled |
| J0                                | K0   | L0               | O Quenched and tempered                      |
| ...                               | ...  | ...              | C Particularly suitable for cold forming     |
|                                   |      |                  | D For hot-dip coating                        |
|                                   |      |                  | L For low temperatures                       |
|                                   |      |                  | T For pipes                                  |
|                                   |      |                  | W Weather-resistant                          |

- Designation of 22CrMoS3-3 (manganese content greater than or equal to 1%) according to chemical composition.

| Alloying element          | Factor |
|---------------------------|--------|
| Cr, Co, Mn, Ni, Si, W     | 4      |
| Al, Cu, Mo, Pb, Ta, Ti, V | 10     |
| C, Ca, N, P, S            | 100    |
| B                         | 1000   |

- A work piece has a mass of 6480 g and a volume of 2400 cm<sup>3</sup>.
  - What is the density of the material of the work piece in kg/dm<sup>3</sup>?
  - Which material could this be?



**BHARTIYA SKILL DEVELOPMENT UNIVERSITY**  
**SCHOOL OF MANUFACTURING SKILLS**  
**3<sup>rd</sup> SEMESTER, FIRST IN-SEM. EXAMINATION**  
**WINTER SEMESTER, B.VOC. PROGRAM**  
**SESSION 2018-2019**

**Course Code: SMS1506**

**Time (Minutes): 60**

**Course Name: Project Preparation**

**Maximum Marks: 20**

**Section- A**

1. What is S235 in S235JRC+C material designation.

Ans. Main Symbol

2. Steel are material

Ans. whose main component is iron that generally have a carbon percentage of less than 2%.

3. Refining of PIG iron to steel

Ans. Both a & b

4. \_\_\_\_\_ is the heavy metal (density > 5kg/dm<sup>3</sup>)

Ans. Copper

5. Which is not a Natural material?

Ans. Ceramics

**Section B**

6. What is PIG Iron?

Ans. Pig iron is a semi-finished metal produced from iron ore in a blast furnace, it contains 92% iron, high measures of carbon, can say up to 3.5%, and adjust generally manganese and silicone in addition to small amount of phosphorus, sulfur, and different polluting influences. Pig iron is further refined in a heater for change into steel

7. What is understood by the term "Refining"?

Ans. Refining is a process of reducing the carbon content while the most undesired substances are eliminated.

8. Define Linear thermal expansion.

Ans. **Linear Thermal Expansion:** The coefficient of linear thermal expansion  $\alpha$  is the change in length  $\Delta l$  of a 1m long body that occurs for a temperature change  $\Delta t = 1^\circ\text{C}$ .



The thermal expansion  $\Delta l$  must be taken into account for measuring instruments and mounted parts or for cast parts. Cast parts undergo heat shrinkage after casting and this must be compensated for by a size allowance.

### Section C

9. Explain basic oxygen process in production of Steel?

Ans. The basic oxygen process takes place in a convertor.

The convertor is loaded with Scrap iron and liquid Pig Iron in the filling position.

It is then raised and oxygen is blown onto the pig iron melt at 8 to 12 bar.

This leads to a fierce reaction between the oxygen and the iron contaminants so that the melt boils. Lime is now added. It forms a liquid slag on the melt and binds the solid combustion products and the undesired iron contaminants. The carbon in the Pig Iron is almost completely burnt up to form CO and CO<sub>2</sub>, which rise as gases, during the refining process. The required alloying components and deoxidation agents are added at the end of refining process, before pouring the steel. The steel is then first poured through the convertor's opening into the casting ladle provided.

The slag is then poured off over the edge of the convertor.

10. Explain the following.

a) Designation of S235 JRC+C according to the properties.

Ans. S- Structural Steels, 235- Minimum Yield Point & JRC- Notch Toughness

| Use                                     | Main symbols (examples) | Use                    | Main symbols (examples) |
|---|-------------------------|------------------------|-------------------------|
| Reinforcing steels                      | B 500 <sup>1)</sup>     | Pressure vessel steels | P 265 <sup>1)</sup>     |
| Flat products for cold forming          | D X52 <sup>2)</sup>     | Rail steels            | R 260 <sup>1)</sup>     |
| Engineering steels                      | E 360 <sup>1)</sup>     | Structural steels      | S 235 <sup>1)</sup>     |
| Flat products from high strength steels | H C400 <sup>2)</sup>    | Tinmill products       | T S550 <sup>1)</sup>    |
| Linepipe steels                         | L 360 <sup>1)</sup>     | Prestressing steels    | Y 1,770 <sup>1)</sup>   |

| Group 1                   |      |      |                  | Group 2 |  |
|---------------------------|------|------|------------------|---------|--|
| Notch toughness in joules |      |      | Test temp. in °C | A       | Precipitation-hardened                     |
| 27 J                      | 40 J | 60 J |                  | M       | Thermo-mechanically rolled                 |
| JR                        | KR   | LR   | +20              | N       | Normalising annealed or normalising rolled |
| JO                        | KO   | LO   | 0                | O       | Quenched and tempered                      |
| ...                       | ...  | ...  | ...              | C       | Particularly suitable for cold forming     |
|                           |      |      |                  | D       | For hot-dip coating                        |
|                           |      |      |                  | L       | For low temperatures                       |
|                           |      |      |                  | T       | For pipes                                  |
|                           |      |      |                  | W       | Weather-resistant                          |

b) Designation of 22CrMoS3-3 (manganese content greater than or equal to 1%) according to chemical composition.

Ans. It is an alloy steel with 22/100= 0.22% of C

3/4 = 0.75% Cr and 3/10= 0.3% Mo content



**BHARTIYA SKILL DEVELOPMENT UNIVERSITY**  
**SCHOOL OF MANUFACTURING SKILLS**  
**3<sup>rd</sup> SEMESTER, FIRST IN-SEM. EXAMINATION**  
**WINTER SEMESTER, B.VOC. PROGRAM**  
**SESSION 2018-2019**

**Course Code: SMS1506**

**Time (Minutes): 60**

**Course Name: Project Preparation**

**Maximum Marks: 20**

**Section- A**

1. What is S235 in S235JRC+C material designation.

Ans. Main Symbol

2. Steel are material

Ans. whose main component is iron that generally have a carbon percentage of less than 2%.

3. Refining of PIG iron to steel

Ans. Both a & b

4. \_\_\_\_\_ is the heavy metal (density > 5kg/dm<sup>3</sup>)

Ans. Copper

5. Which is not a Natural material?

Ans. Ceramics

**Section B**

6. What is PIG Iron?

Ans. Pig iron is a semi-finished metal produced from iron ore in a blast furnace, it contains 92% iron, high measures of carbon, can say up to 3.5%, and adjust generally manganese and silicone in addition to small amount of phosphorus, sulfur, and different polluting influences. Pig iron is further refined in a heater for change into steel

7. What is understood by the term "Refining"?

Ans. Refining is a process of reducing the carbon content while the most undesired substances are eliminated.

8. Define Linear thermal expansion.

Ans. **Linear Thermal Expansion:** The coefficient of linear thermal expansion  $\alpha$  is the change in length  $\Delta l$  of a 1m long body that occurs for a temperature change  $\Delta t = 1^\circ\text{C}$ .



The thermal expansion  $\Delta l$  must be taken into account for measuring instruments and mounted parts or for cast parts. Cast parts undergo heat shrinkage after casting and this must be compensated for by a size allowance.

### Section C

9. Explain basic oxygen process in production of Steel?

Ans. The basic oxygen process takes place in a convertor.

The convertor is loaded with Scrap iron and liquid Pig Iron in the filling position.

It is then raised and oxygen is blown onto the pig iron melt at 8 to 12 bar.

This leads to a fierce reaction between the oxygen and the iron contaminants so that the melt boils. Lime is now added. It forms a liquid slag on the melt and binds the solid combustion products and the undesired iron contaminants. The carbon in the Pig Iron is almost completely burnt up to form CO and CO<sub>2</sub>, which rise as gases, during the refining process. The required alloying components and deoxidation agents are added at the end of refining process, before pouring the steel. The steel is then first poured through the convertor's opening into the casting ladle provided.

The slag is then poured off over the edge of the convertor.

10. Explain the following.

a) Designation of S235 JRC+C according to the properties.

Ans. S- Structural Steels, 235- Minimum Yield Point & JRC- Notch Toughness

| Use                                     | Main symbols (examples) | Use                    | Main symbols (examples) |
|---|-------------------------|------------------------|-------------------------|
| Reinforcing steels                      | B 500 <sup>11</sup>     | Pressure vessel steels | P 265 <sup>11</sup>     |
| Flat products for cold forming          | D X52 <sup>21</sup>     | Rail steels            | R 260 <sup>41</sup>     |
| Engineering steels                      | E 360 <sup>11</sup>     | Structural steels      | S 235 <sup>11</sup>     |
| Flat products from high strength steels | H C400 <sup>21</sup>    | Tinmill products       | T S550 <sup>11</sup>    |
| Linopipe steels                         | L 360 <sup>11</sup>     | Prestressing steels    | Y 1,770 <sup>21</sup>   |

  

| Group 1                   |      |      |                  | Group 2 |  |
|---------------------------|------|------|------------------|---------|--|
| Notch toughness in joules |      |      | Test temp. in °C | A       | Precipitation-hardened                     |
| 27 J                      | 40 J | 60 J |                  | M       | Thermo-mechanically rolled                 |
| JR                        | KR   | LR   | +20              | N       | Normalising annealed or normalising rolled |
| JO                        | KO   | LO   | 0                | O       | Quenched and tempered                      |
| ...                       | ...  | ...  | ...              | C       | Particularly suitable for cold forming     |
|                           |      |      |                  | D       | For hot-dip coating                        |
|                           |      |      |                  | L       | For low temperatures                       |
|                           |      |      |                  | T       | For pipes                                  |
|                           |      |      |                  | W       | Weather-resistant                          |

b) Designation of 22CrMoS3-3 (manganese content greater than or equal to 1%) according to chemical composition.

Ans. It is an alloy steel with 22/100= 0.22% of C

3/4 = 0.75% Cr and 3/10= 0.3% Mo content



| Alloying element          | Factor |
|---------------------------|--------|
| Cr, Co, Mn, Ni, Si, W     | 4      |
| Al, Cu, Mo, Pb, Ta, Ti, V | 10     |
| C, Ce, N, P, S            | 100    |
| B                         | 1000   |

11. A work piece has a mass of 6480 g and a volume of 2400 cm<sup>3</sup>.

- a) What is the density of the material of the work piece in kg/dm<sup>3</sup>?
- b) Which material could this be?

Ans. a) Density = mass / volume

$$= 6480 / 2400$$

$$= 2.7 \text{ g/cm}^3$$

Or  $= 2.7 \text{ kg/dm}^3$

b) Material could be Aluminium

