RAJIV GANDHI PROUDYOGIKI VISHVAVIDYALAYA (DIPLOMA WING) BHOPAL
P05 DIPLOMA IN PRODUCTION ENGINEERING
PART A:- PROCESS OF CURRICULUM DEVELOPMENT
SUBJECT: STEEL FABRICATION (403)

LIST OF IDENTIFIED PROFESSIONAL ROLES

1. To apply knowledge of mathematics, science, and engineering.
2. To design and conduct experiments, as well as to analyze and interpret data.
3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. To function on multidisciplinary teams.
5. To identify, formulate, and solve engineering problems.
6. To understand professional and ethical responsibility.
7. To communicate effectively.
8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. To engage in lifelong learning.
10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.

LIST OF SELECTED TERMINAL BEHAVIORS
SUBJECT: STEEL FABRICATION (403)

1. To apply knowledge of mathematics, science, and engineering.
   TB-1 To understand the general principle of steel fabrication.
   TB-2 Know about the working, equipments, applications and selection criteria of various welding and cutting processes

2. To design and conduct experiments, as well as to analyze and interpret data.
   TB1 Interpret various welding and symbols and their different standards.

3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
   TB-1 Selecting a suitable process for producing quality weldments based on materials and applications
   TB-2 Know the safe procedure for making a welded joint.

4. To function on multidisciplinary teams. NIL

5. To identify, formulate, and solve engineering problems
   TB-1 Identify the fabrication materials, consumables based on given standard designations and vice versa.
   TB 2 Identify various defects of welding
   TB 3 Take actions to prevent various welding defects.

6. To understand professional and ethical responsibility. NIL

7. To communicate effectively. NIL

8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context. NIL

9. To engage in lifelong learning. NIL

10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.
    TB-1 To study procedures of inspection and testing and quality control and their standards.

SUBJECT: STEEL FABRICATION (403)

COs FOR SELECTED TERMINAL BEHAVIORS

1. To apply knowledge of mathematics, science, and engineering.
   TB-1 To understand the general principle of steel fabrication.
   CO1 Understand the welding management and prinicple.
   TB-2 Know about the working, equipment, applications and selection criteria of various welding processes.
   CO2 Understand the classification of welding and cutting processes.

2. To design and conduct experiments, as well as to analyze and interpret data.
   TB1 Interpret various welding and symbols and their different standards.
   CO 3 Understand the types, features, merits, demerits and applications of various fabrication processes

3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
   TB-2 Know the safe procedure for making a welded joint.
   CO 5 Understand the safety precaustion during welding operations.

4. To function on multidisciplinary teams. NIL

5. To identify, formulate, and solve engineering problems
   TB 2 Identify various defects of welding
   CO 4:Understand different types of defects found in the welding operation.
   TB 3 Take actions to prevent various welding defects.
   CO 3 Understand the actions taken to prevent various welding defects.

6. To understand professional and ethical responsibility NIL

7. To communicate effectively NIL

8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context. NIL

9. To engage in lifelong learning NIL

10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.
    TB-1 To study procedures of inspection and testing of welding.
    CO4: Understand the procedures the inspection and testing of welding operation.

CO GROUPING AND COURSE FORMATION

COURSE NAME: - STEEL FABRICATION (403)

(Total 100 Hrs. Total 100 Marks)

LIST OF COs:-

CO1: Understand various welding processes. (20 Hrs, 20 marks)

CO2: Understand special welding processes.. (20 Hrs, 20 marks)

CO3: Understand metallurgical aspects in welding and welding design. (20 Hrs, 20 marks)

C04: Understand defects in welds and testing of welds..(20 Hrs,20 marks)

C05: Understand safety in welding and quality control in welding. (20 Hrs, 20 marks)

LOs FORMATION

COURSE NAME: - STEEL FABRICAcTION (403)
(Total 100 Hrs. , Total 100 Marks)

List of COs and Los

CO1: Understand various welding processes. (20 hrs, 20 marks)
LO1: To explain manual and semi automated welding processes. (10 Hrs., 10Marks)
LO2: To explain automated welding processes and robotic welding. (10 Hrs, 10 Marks)

CO2: Understand special welding processes. (20 Hrs, 20 marks)
LO1: To explain solid-state welding processes. **(** 10 Hrs, 10 marks)
LO2: To explain underwater welding processes. **(**10 Hrs, 10 marks)

CO3: Understand metallurgical aspects in welding and welding design. (20 Hrs, 20 marks)
LO1 : To explain metallurgy of welding. **(**10 Hrs, 10 marks)
LO2 : To explain welding symbols and welding design. **(10** Hrs, 10 marks)

CO4: Understand defects in welds and testing of welds. (20 Hrs,20 marks)
LO1: To know about the different type of weld defects. **(**10 Hrs, 10 marks)
LO2: To describe the various non-destructive method of testing. **(10** Hrs, 10 marks)

CO5: Understand safety in welding and quality control in welding. (20 Hrs, 20 marks)
LO1: To explain possible hazards in welding and cutting. **(**10 Hrs, 10 marks)
LO2: To explain quality control in welding. **(**10 Hrs, 10 marks)

PART B:- CURRICULUM OF PRODUCTION ENGINEERING

RGPV (Diploma Wing) Bhopal		COURSE PLAN		Format -2		Sheet No. ½	
Course Name	**STEEL FABRICATION**			Semester	FORTH		
Branch	PRODUCTION ENGINEERING	Course Code	403	No. of Cos	05	No. of LOs	10
Total Hrs. of Teaching Learning	100	Total Marks	100	Total no. of Assessments		Types of Assessments		No. of External Assessments	

		DESCRIPTION OF OUTCOMES	T-L Hrs.	Max. Marks
CO 1	P054031	**Understand various welding processes.**	20	20
Los	PO540311	To explain manual and semi automated welding processes.	10	10
	PO540312	To explain automated welding processes and robotic welding.	10	10
CO 2	P054032	**Understand special welding processes.**	20	20
Los	PO540321	To explain solid-state welding processes.	10	10
	PO540322	To explain underwater welding processes.	10	10
CO 3	P054033	**Understand metallurgical aspects in welding and welding design**	20	20
Los	PO540331	To explain metallurgy of welding.	10	10
	PO540332	To explain welding symbols a nd welding design.	10	10
CO 4	P054034	**Understand defects in welds and testing of welds.**	20	20
Los	PO540341	To know about the different type of weld defects.	10	10
	PO540342	To describe the various non-destructive method of testing.	10	10
CO 5	P054035	**Understand safety in welding and quality control in welding.**	20	20
Los	PO540351	To explain possible hazards in welding and cutting.	10	10
	PO540352	To explain quality control in welding.	10	10

RGPV (DIPLOMA WING) BHOPAL	OCB CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 1/3

Branch	PRODUCTION ENGINEERING	Semester	Fourth

Course Code	403	Course Name	**STEEL FABRICATION**	Teach Hrs	Marks
Course Outcome 1	**Understand various welding processes.**			**20**	**20**
Learning Outcome 1	To explain manual and semi automated welding processes.			10	10
CONTENT	To explain the definition and concept, principal, operation, equipments, applications of Gas tungsten arc welding, Gas metal arc welding, Flux-cored Arc welding and CO2 welding.				
Method of Assessment	Paper pen test/ Practical assessment				
Learning Outcome 2	To explain automated welding processes and robotic welding.			10	10
CONTENT	To explain the definition and concept, principal operation, equipments, applications of Submerged arc welding, electro slag welding and Robotic Welding.				
Method of Assessment	Paper pen test/ Practical assessment				
Course Outcome 2	**Understand special welding processes.**			20	20
Learning Outcome 1	To explain solid-state welding processes.			10	10
CONTENT	To explain the definition and concept, principal, operation, applications of Cold welding, Diffusion welding, Utrasonic welding, Explosive and Friction welding.				
Method of Assessment	Paper pen test/ Practical assessment				
Learning Outcome 2	To explain underwater welding processes.			10	10
CONTENT	Introduction, Problem encountered in underwater welding, Types of underwater welding, Application of underwater welding.				
Method of Assessment	Paper pen test/ Practical assessment				
Course Outcome 3	**Understand metallurgical aspects in welding and welding design.**				
Learning Outcome 1	To explain metallurgy of welding			10	10
CONTENT	Introduction, welding arc, heat flow and temperature distribution in around weld metal, cooling rate of welds, metallurgical effects of welding, weld metal solidification.				
Method of Assessment	Paper pen test				
Learning Outcome 2	To explain welding symbols and welding design.			10	10
CONTENT	Introduction, Representing the welds, Basic weld symbols, Principles of sound welding design,Welding joint design, welding positions, allowable strengths of weld, under steady				

	load, allowable fatique strength of welds.		
Method of Assessment	Paper pen test		
Course Outcome 4	**Understand defects in welds and testing of welds.**	20	20
Learning Outcome 1	To know about the different type of weld defects.	10	10
CONTENT	Introduction, Cracks, Distortion, Incomplete penetration, Inclusions, Porsosity and blowholes or gas pockets, Poor fusion, Spatter, Under-cutting and overlaaping , causes and remedies.		
Method of Assessment	Paper pen test/ Practical assessment		
Learning Outcome 2	To describe the various non-destructive method of testing.	10	10
CONTENT	Purpose and limitations of NDT, Concepts, operating principles, advantages, limitations, of liquid penetrant and magnetic particle testing, eddy current testing, ultrasonic testing radiography.		

Method of Assessment	Paper pen test/ Practical assessment		
Course Outcome 5	**Understand safety in welding and quality control in welding.**	20	20
Learning Outcome 1	To explain possible hazards in welding and cutting.	10	10
CONTENT	Possible hazards in welding and cutting, causes and remedies and safety rules for arc welding operations.		
Method of Assessment	Paper pen test		
Learning Outcome 2	Understand quality control in welding.	10	10
CONTENT	Introduction, quality assurance v/s quality control, weld quality, discontinuities in welds, their causes and remedies and quality conflicts.		
Method of Assessment	Paper pen test		

CO1:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 01	LO Code 01	Format No. 4

COURSE NAME	**STEEL FABRICATION**
CO Description	**Understand various welding processes.**
LO Description	To explain manual and semi automated welding processes.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	To explain the definition and concept, principal operation, equipments, applications of Gas tungsten arc welding,Gas metal arc welding, Flux-cored Arc welding and CO2 welding.	Traditional Lecture method + Practical (Welding Shop)	Teacher will explain the contents. Teacher will conduct Progressive test/ give Assignment. Also, students will do practical to gain Knowledge of manual and automated welding and its classification	5	5	Handout, Book.	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assessment	For the given learning content, Students write answer of questions and face Practical Viva	10	Progressive test/ End semester exam/ Practical file	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practicals

1.Study of Gas tungsten arc welding(GTAW) welding.

2.Study of Gas metal arc welding(GMAW) welding.

3.Virtual lab or youtube video or Visit to industry.

CO1:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 01	LO Code 02	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand various welding processes.**
LO Description	To explain automated welding processes and robotic welding..

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	To explain the definition and concept, principal operation, equipments, applications of Submerged arc welding, electro slag welding and Robotic Welding.	Traditional Lecture method + Practical (Welding Shop)	Teacher will explain the content.. Teacher will conduct Progressive test/quiz so that students explain the different welding processes.	5	5	Handout, Book, Welding Shop	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assesment	For the given learning content, Students write answer of questions and face Practical Viva	10	Progressive test/ End semester exam/ Practical file	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

1. Study of submerged arc (SAW) welding.
2. Study of electro slag (ESW) welding.
3. Virtual lab or youtube video or Visit to industry

CO2:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 02	LO Code 01	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand special welding processes.**
LO Description	To explain solid-state welding processes.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	To explain the definition and concept, principal operation, applications of Cold welding, Diffusion welding, Utrasonic welding, Explosive and Friction welding.	Traditional Lecture method + assignment	Teacher will explain the contents and provide handout to students. Teacher will conduct Progressive test/assignment.	5	5	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test /Practical assesment	For the given learning content, Students write answer of questions.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practicals

1. Study of Solid state welding processes (Any Two)
2. Virtual lab or youtube video or Visit to industry

CO2:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 02	LO Code 02	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand special welding processes.**
LO Description	To explain underwater welding processes.

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction, Problem encountered in underwater welding, Types of underwater welding, Application of underwater welding.	Traditional Lecture method + Practical (Welding Shop)	Teacher will explain the learing outcome.	5	5	Handout, Book, Welding Shop	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test /Practical assessment	For the given learning content, Students write answer of questions and face Practical Viva	10	Practical file/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practicals

1.Study of underwater welding processes.

2. Virtual lab or youtube video or Visit to industry

CO3:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 03	LO Code 01	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand metallurgical aspects in welding and welding design.**
LO Description	To explain metallurgy of welding.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction, welding arc, heat flow and temperature distribution in around weld metal, cooling rate of welds,metallurgical effects of welding, weld metal solidification.	Traditional Lecture method + Practical (Welding Shop)	Teacher will explain the contents to students. Students will do practical in welding shop to understand friction welding techniques	10	-	Handout, Book, Welding Shop	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions and face Practical Viva	10	Practical file/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. Refer Handouts/Books/Powerpoint

CO3:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 03	LO Code 02	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand metallurgical aspects in welding and welding design**
LO Description	To explain welding symbols and welding design.

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction, Representing the welds, Basic weld symbols, Principles of sound welding design,Welding joint design, welding positions, allowable strengths of weld, under steady load, allowable fatique strength of welds.	Traditional Lecture method + Assignment + Quiz	Teacher will explain the contents to students. Students will learn about working and applications of advanced welding processes	10	-	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions,	10	Assigment/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO4:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 04	LO Code 01	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand defects in welds and testing of welds.**
LO Description	To know about the different type of weld defects.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction,Cracks, Distortion, Incomplete penetration, Inclusions, Porsosity and blowholes or gas pockets, Poor fusion, Spatter, Under-cutting and overlaaping , causes and remedies.	Traditional Lecture method	Teacher will explain the contents. Teacher will conduct Progressive test/ give Assignment so that students know about possible defects in casting along with their causes and remedies	5	5	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test /Practical assessment	For the given learning content, Students write answer of questions.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

1.Study of different types of welding defects.

2. Youtube video or Visit to industry.

CO4:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 04	LO Code 02	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand defects in welds and testing of welds.**
LO Description	To describe the various non-destructive method of testing.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Purpose and limitations of NDT, Concepts, operating principles, advantages, limitations, of liquid penetrant and magnetic particle testing, eddy current testing, ultrasonic testing radiography.	Traditional Lecture method	Teacher will explain the contents. Teacher will conduct Progressive test/ give Assignment so that students know about inspection and testing of castings	5	5	Handout, Book	

SCHEME OF ASSESSMENT

S.No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/Practical assessment	For the given learning content, Students write answer of questions.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

1.Study of various non-destructive method of testing.

2. Virtual lab or youtube video or Visit to industry

CO5:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 05	LO Code 01	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand safety in welding and quality control in welding.**
LO Description	To explain possible hazards in welding and cutting.

SCHEME OF STUDY

S. No.	Learning Content	Teaching-Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Possible hazards in welding and cutting, Causes and remedies and Safety rules for arc welding operations	Traditional Lecture method	Teacher will explain the contents to students so that students know about the brazing and soldering	10	-	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF .ANY)

1. Refer ‘youtube video’.

CO5:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 403	CO Code 05	LO Code 02	Format No. 4

COURSE NAME	STEEL FABRICATION
CO Description	**Understand safety in welding and quality control in welding.**
LO Description	Understand quality control in welding.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction, quality assurance v/s quality control, weld quality, discontinuities in welds, their causes and remedies and quality conflicts.	Traditional Lecture method	Teacher will explain the contents to students so that students know about the cutting processes.	10	-	Handout, Book, Laboratory	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	10	Progressive Test paper/End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Reference Books:

1. Elements of Workshop Technology Volume I & II, Hajra Choudhary & Bhattacharaya, Media Promoters, 11th Edition, 2007
2. Introduction of Basic Manufacturing Processes and Workshop Technology, Rajender Singh, New age International (P) Ltd. New Delhi- 110002, 2006
3. Manufacturing Process Begeman, Tata McGraw Hill, New Delhi.
4. Workshop Technology- Volume I, II, & III, WAJ Chapman Viva Books Pvt. Ltd., New Delhi
5. Welding Technology By O. P. Khanna
6. Production Technology By R. K. Jain
7. Workshop Technology By Raghuwanshi
8. Production Technology by P.C. Sharma, S Chand
9. Process and Materials of Manufacture By Lindberg, PHI
10. Welding Technology and Design By V.M.Radhakrishnan
11. A textbook of Welding Technology By G.D.Garg