INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING
TUTORIAL QUESTION BANK

Course Name	**ADVANCED WELDING TECHNOLOGY**
Course Code	**AME808**
Class	VII Semester
Branch	Mechanical Engineering
Year	2019 – 2020
Course Coordinator	Mr. VKVS KrishnamRaju, Assistant Professor
Course Faculty	Mr. VKVS KrishnamRaju, Assistant Professor

COURSE OBJECTIVES:

The course should enable the students:

I	Comprehensive understanding of different manufacturing processes for product development.
II	Apply, casting, metal joining and forming processes for various industries.
III	Select process parameters, equipment for material processing.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

AME808.01	Understand various welding processes.
AME808.02	Explain thermit welding, spot welding.
AME808.03	Explain limitations thermit welding, spot welding.
AME808.04	Explain flash butt welding.
AME808.05	Understand destructive test welding
AME808.06	Demonstrate the preparation of moulds for various casting processes
AME808.07	Describe applications of various casting processes
AME808.08	Explain principles of welding, brazing and soldering processes..
AME808.09	Demonstrate use of welding equipment for various industrial applications.
AME808.10	Demonstrate use of Brazing and soldering equipment for various industrial applications.
AME808.11	Explain design of welded joints, residual stresses, distortion and control.
AME808.12	Explain causes and remedies of welding defects.
AME808.13	Compare destructive and non-destructive testing techniques.
AME808.14	Understand the effect of heat input in welds.
AME808.15	Explain Stresses in weld joints.
AME808.16	Explain combined loads in welded joints.
AME808.17	Explain weld quality.
AME808.18	Explain Stresses in weld joints.

UNIT –I			
INTRODUCTION			
Part - A (Short Answer Questions)			
SNo	**QUESTION**	**Blooms Taxonomy Level**	**Course Learning Outcomes**
1	What is the use of flux in welding?	Understand	AME808.01
2	Write a short note on butt welding.	Understand	AME808.01
3	List out minimum six types of welding process.	Remember	AME808.01
4	Write a short note on the symbol of weld?	Remember	AME808.01
5	List out the sources of energy used for welding?	Remember	AME808.01
6	What is the use of filler material in welding?	Understand	AME808.01
7	Define carburizing flame and give its ratio?	Understand	AME808.01
8	Define oxidizing flame and give its ratio?	Understand	AME808.01
9	Define neutral flame and give its ratio?	Remember	AME808.02
10	List out the gases used in gas welding?	Remember	AME808.02
11	What is the use of heat gas in welding?	Remember	AME808.02
12	What is the source of welding heat in Thermit welding?	Understand	AME808.02
13	What reaction takes place in thermit welding?	Understand	AME808.02
14	List out the electrode materials used in welding?	Remember	AME808.02
15	List out the chemical reactions on thermite welding?	Remember	AME808.02
16	What is the application of thermit welding?	Remember	AME808.03
17	What is forge welding and how any types are there?	Remember	AME808.03
18	What is the function of coating material in coated electrodes?	Remember	AME808.03
19	Write the principle of resistance welding.	Understand	AME808.03
20	What are main factors to be considered in resistance welding?	Understand	AME808.03
Part - B (Long Answer Questions)			
1	Discuss classification of welding processes.	Understand	AME808.01
2	Explain different types of flames with neat sketches in gas welding process. Give applications for each type.	Remember	AME808.02
3	Explain the advantages and limitations of oxy-acetylene welding	Understand	AME808.02
4	Discuss shielded metal arc welding process with a neat sketch.	Understand	AME808.03
5	Explain the function of coating in shielded metal arc welding process.	Remember	AME808.02
6	Discuss electric resistance spot welding process. Explain nugget formation.	Remember	AME808.02
7	Compare resistance spot and seam welding.	Understand	AME808.03
8	Compare resistance upset butt and flash butt welding process	Understand	AME808.04
9	Explain with neat sketch thermit welding process.	Remember	AME808.03
10	Discuss estimation of cost for shielded metal arc welding process.	Understand	AME808.06
11	Compare gas welding and cutting processes.	Remember	AME808.02
12	Discuss the oxy-acetylene welding process setup.	Understand	AME808.03
13	What are the various safety aspects in gas welding? Explain.	Understand	AME808.02
14	Explain the advantages and disadvantages of shielded metal arc welding.	Remember	AME808.02
15	Define polarity as applied to DC arc welding. How is this advantageously used?	Remember	AME808.03
16	Discuss parameters used in resistance spot welding process. Give the industrial applications of spot welding process.	Understand	AME808.03

17	Explain projection welding process and its application.	Understand	AME808.03
18	Discuss the sequence of flash butt welding process. Give applications.	Remember	AME808.03
19	Discuss the advantages and limitations of thermite welding process.	Remember	AME808.03
20	Explain the calculation of productivity in arc welding.	Understand	AME808.07
UNIT - II			
INSPECTION OF WELDS			
Part – A (Short Answer Questions)			
SNo	**QUESTION**	**Blooms Taxonomy Level**	**Course Learning Outcomes**
1	Define the non- destructive testing?	Remember	AME808.08
2	What are the objectives of noon- destructive testing?	Understand	AME808.08
3	List any four uses of NDT methods.	Understand	AME808.06
4	What are purposes of material testing? .	Understand	AME808.06
5	Name any four commonly employed destructive tests.	Understand	AME808.07
6	What are the advantages of non- destructive testing?	Remember	AME808.05
7	List any four limitations of non-destructive testing?	Remember	AME808.05
8	What do you mean by visual inspection?	Remember	AME808.07
9	Distinguish between aided and unaided visual testing.	Remember	AME808.08
10	List any six optical aids that are being used in visual inspection.	Remember	AME808.08
11	What is the principle of liquid penetrant testing?	Remember	AME808.08
12	What types of defects can be detected in a liquid penetrant test?	Remember	AME808.09
13	What are the different methods of penetrant application?	Remember	AME808.09
14	What is meant by dwell and development time with respect to liquid penetrant testing?	Remember	AME808.09
15	List any four typical defects that can be detected with liquid penetrant testing and their indications.	Remember	AME808.09
16	Difference between the fluorescent and visible penetrants?	Remember	AME808.09
17	List any four desirable characteristics of a good developer.	Remember	AME808.08
18	List out any six commonly used non – destructive testing methods/ techniques.	Remember	AME808.08
19	List the basic elements in NDT methods?	Understand	AME808.08
20	What is the Use of the telescopes and periscopes as a visual inspection aid?	Remember	AME808.08
Part - B (Long Answer Questions)			
1	Compare and contrast destructive and non- destructive testing methods.	Understand	AME808.08
2	Enlist, in detail various non-destructive testingmethods/techniques.	Understand	AME808.08
3	Compare and contrast the principles, characteristics detected, advantages, limitations applications of visual inspection and liquidpenetrant testing.	Understand	AME808.08
4	Explain the principle and types of visual testing method.Bring out the advantages, Limitations and applications of visual inspection.	Remember	AME808.09
5	Explain the principle of liquid penetrant testing with neat sketch. Also bring out the advantages and limitations of the liquid penetrant testing.	Remember	AME808.09
6	Explain the liquid penetrant testing flow chart? and write thelimitations of liquid penetrant testing.	Remember	AME808.09
7	Discuss about the surface preparation, dwell or penetrant time and removal of	Remember	AME808.09

	excess penetrant.		
8	Discuss about the post- emulsification method, solvent removalmethod and application of developer liquid penetrant testing?	Understand	AME808.09
9	Write about examination, interpretation and evaluation process in liquid penetrant testing.	Understand	AME808.10
10	Explain about advantages, limitations and applications of Magneticparticle testing.	Remember	AME808.10
11	Explain in details various steps involved in magnetic particle testing?	Remember	AME808.10
12	Discuss about longitudinal magnetization, and circumferentialmagnetization in magnetic particle testing.	Understand	AME808.10
13	Explain about dry and wet particle inspection techniques inmagnetic particle testing.	Understand	AME808.10
14	Explain about magnetization equipment, portable power supplies,and lighting equipment.	Understand	AME808.10
15	Explain what are the equipment used in determination of magneticfield strength and direction.	Understand	AME808.09
16	Write on the following portable magnetization equipments :Permanent magnetElectromagnetic YokesProds	Remember	AME808.08
17	Explain the working of wet horizontal type magnetizationequipment used in magnetic article testing.	Remember	AME808.09
18	Explain the about different type of magnetic particles used inmagnetic particle testing?	Remember	AME808.09
19	Compare and contrast the applicability and capability of variousNDT methods.	Understand	AME808.08
20	(a) Explain the principle and types of visible testing of visibletesting methods.	Understand	AME808.08

UNIT-III			
ADVANCED WELDING TECHNOLGY			
Part - A (Short Answer Questions)			
SNo	**QUESTION**	**Blooms Taxonomy Level**	**Course Learning Outcomes**
1	Differentiate between TIG welding and MIG welding.	Understand	AME808.09
2	Write the constituents of electrode coating with their functions.	Understand	AME808.08
3	What is heat shrinkage in spot welding?	Remember	AME808.11
4	What is the effect of clearance in brazing?	Understand	AME808.10
5	What is the need of flux in brazing?	Understand	AME808.10
6	What are the process variables in explosive welding?	Understand	AME808.09
7	What are the modes of metal transfer in arc welding?	Understand	AME808.09
8	How is brazing different from welding and soldering?	Understand	AME808.10
9	Define solid state welding?	Remember	AME808.09
10	What are the functions of coating in coated electrode?	Understand	AME808.09
11	List out various defects caused in welding.	Understand	AME808.12
12	What are the various destructive and non-destructive testing techniques used to test the quality of welded joints?	Remember	AME808.13
13	What do you mean by non-destructive testing of welds?	Understand	AME808.13

14	Write a short note on visual inspection methods.	Understand	AME808.13
15	What is the effect of carbon in welding of plain carbon steels?	Remember	AME808.08
16	What are the sources of weld spatter? How can it be controlled?	Remember	AME808.11
17	Why is the quality of SAW very good?	Understand	AME808.11
18	What is the effect of preheating in welding?	Remember	AME808.14
19	State some of the NDT techniques used for testing weldments.	Understand	AME808.13
20	State some of the Destructive testing techniques used for testing weldments.	Understand	AME808.13
Part – B (Long Answer Questions)			
1	How to carry out manual arc welding process? Explain the procedure.	Understand	AME808.08
2	Explain the spot welding cycle with neat sketch.	Understand	AME808.09
3	Explain the various types of resistance welding processes. What are the advantages, disadvantages and their limitations?	Understand	AME808.09
4	Explain explosive welding with a neat sketch.	Remember	AME808.09
5	Explain briefly about brazing operation.	Remember	AME808.10
6	What is laser welding? Explain with application, advantages and disadvantages.	Remember	AME808.09
7	Write the weld properties, advantages and limitations of friction welding.	Understand	AME808.09
8	Explain about brazing process with applications.	Understand	AME808.10
9	What is soldering? Explain with applications.	Remember	AME808.10
10	Discuss some of the attractive features of gas tungsten arc welding Process. What are the various gases used in this process?	Remember	AME808.09
11	What do you understand by heat affected zone in welding?	Understand	AME808.14
12	List the various welding defects which commonly occur. Discuss them in brief.	Remember	AME808.12
13	What are the destructive testing methods used in welding? Explain.	Understand	AME808.13
14	Explain non-destructive testing methods for welding.	Remember	AME808.13
15	Explain the term HAZ in welding and its role in the success of a weldment.	Understand	AME808.14
16	Why do properties vary widely in most welding heat affected zones?	Understand	AME808.14
17	Name the various destructive and non-destructive testing methods for welds. Explain the principle of radiography with neat sketches.	Remember	AME808.13
18	Describe briefly the following non-destructive testing methods, (i) Magnetic particletest (ii) Eddy currenttest	Remember	AME808.13
19	List any five welding defects and describe the consequences of those defects and remedies.	Remember	AME808.12
20	What is heat affect zone and explain briefly the metallurgical transformations during welding.	Understand	AME808.14
UNIT-IV			
WELDING SYMBOLS			
Part – A (Short Answer Questions)			
SNo	**QUESTION**	**Blooms Taxonomy Level**	**Course Learning Outcomes**
1	What is symbol for single bevel butt weld joint?	Remember	AME808.15
2	How the location of welds are defined?	Remember	AME808.15
3	How what is the symbol for single J butt weld?	Remember	AME808.15

4	What are different types of V Butt welds?	Understand	AME808.15
5	Define heat affected zone?	Understand	AME808.13
6	Define fusion zone?	Understand	AME808.13
7	Define weld metal zone?	Remember	AME808.13
8	Define weld joint?	Understand	AME808.15
9	What are the procedure welding dimensions?	Remember	AME808.12
10	Explain the Symbol of welding joint?	Understand	AME808.12
11	What is the indication of dashed line in the welding symbol?	Remember	AME808.12
12	What arte the different welding defects?	Understand	AME808.12
13	Explain backing run in the welding joints and draw the symbol?	Remember	AME808.15
14	What are the different symbols showing the position according to the reference line?	Remember	AME808.15
15	What are the different methods of indicating dimensions of fillet weld joint?	Understand	AME808.15
16	Define root gap?	Remember	AME808.12
17	Define back weld?	Remember	AME808.12
18	Define throat thickness?	Remember	AME808.12
19	Define root face?	Remember	AME808.12
20	Explain fusion penetration?	Remember	AME808.12
Part – B (Long Answer Questions)			
S No	**QUESTION**	**Blooms Taxonomy Level**	**Course Learning Outcomes**
1	What are the different elementary symbols and their designation in welding joint?	Understand	AME808.11
2	Explain different supplementary symbols used in welding?	Understand	AME808.11
3	Explain method of representation of a welding join with neat sketch?	Remember	AME808.11
4	Explain the rules in dimensioning of weld?	Remember	AME808.11
5	Explain various zones for a typical weld with a neat sketch?	Understand	AME808.11
6	Explain fusion penetration with neat sketch?	Remember	AME808.12
7	Explain heat effected zone with neat sketch?	Understand	AME808.12
8	Explain different lap joints with neat sketch?	Remember	AME808.12
9	Explain different butt joints with neat sketch?	Understand	AME808.12
10	What are the main considerations involved selecting a weld joint?	Understand	AME808.12
11	Explain in brief different elements of welding symbol?	Understand	AME808.12
12	Explain with a neat sketch standard location of welding symbols?	Remember	AME808.13
13	Explain the strength of transverse fillet welded joint?	Remember	AME808.13
14	Derive the expression for the tensile strength of the joint for single fillet weld?	Understand	AME808.13
15	Derivethe expression for throat area of the weld joint?	Remember	AME808.13
16	Explain the strength of parallel fillet welded joint?	Understand	AME808.13
17	Explain different types of transverse fillet weld with neat sketch?	Understand	AME808.13
18	Derive the expression for a circular fillet weld subjected to torsion?	Remember	AME808.13
19	Derive the expression for bending moment of circular fillet weld?	Remember	AME808.13
20	Derive the expression for long fillet weldsubjected to torsion?	Understand	AME808.13

UNIT-V			
WELDING DESIGN			
Part - A (Short Answer Questions)			
1	Define weld throat thickness?	Understand	AME808.14
2	What are different stresses induced in welded joint?	Remember	AME808.14
3	Define reinforcement in welded joint?	Remember	AME808.14
4	Define stress concentration factor for welded joint?	Remember	AME808.14
5	What is quality assurance in weld joint?	Understand	AME808.14
6	What are discontinuities in welds?	Understand	AME808.14
7	What are the parameters effecting weld quality?	Understand	AME808.14
8	What are the causes of discontinuities in weld?	Understand	AME808.14
9	What is the expression for throat are in the weld?	Understand	AME808.15
10	Define tensile strength of butt joint?	Understand	AME808.15
11	What is the strength of the single fillet weld?	Remember	AME808.15
12	What is the polar moment of inertia of circular fillet weld?	Remember	AME808.15
13	What is the section modulusof circular fillet weld?	Remember	AME808.15
14	What is the polar moment of inertia of long fillet weld?	Understand	AME808.15
15	What is the section modulus of of longfillet weld?	Understand	AME808.15
16	Define the efficiency of weld joint?	Understand	AME808.16
17	What is the bending stress in circular fillet weld?	Remember	AME808.16
18	Define leg size of the weld?	Understand	AME808.16
19	What are different loads acting on a weld joints?	Understand	AME808.16
20	What are the remedies for discontinuities in welds?	Understand	AME808.16
Part - B (Long Answer Questions)			
1	Classify the different regions of oxy-acetylene flame and with the help of neat sketches explain their characteristics.	Understand	AME808.14
2	State the purpose of Thermit welding. Where would you recommend it and why?	Understand	AME808.14
3	Why is cleaning of metal is important for successful resistance welding? Explain.	Understand	AME808.14
4	Calculate the melting efficiency in the case of arc welding of steel with a potential of 20V and current of 200A. The travel speed is 5mm/s and the cross sectional area of the joint is 20mm^2. Heat required to melt steel may be taken as 10J/mm^3 and the heat transfer efficiency as 0.85.	Understand	AME808.14
5	Explain the effect of “Thermal conductivity” and “Thermal expansion” on Welding process.	Remember	AME808.14
6	In an arc welding process, the voltage and current are 25V and 300A respectively. The arc heat transfer efficiency is 0.85 and welding speed is 8mm/s. What is the net heat input in J/mm?	Remember	AME808.15
7	Why do we do the edge preparation before welding? What are the different ways of edge preparation techniques?	Remember	AME808.15
8	Write primary and secondary combustion equations in oxy-acetylene gas welding process. Is it an endothermic process or exothermic process?	Understand	AME808.15
9	In a given arc welding operation, the power source is at 20V and current is at 300A. If the electrode travel speed is 6mm/s, calculate the cross sectional areaofthejoint.Theheattransferefficiencyis0.8andmeltingefficiencyis 0.30. Heat required to melt the steel is 10J/mm^2.	Understand	AME808.15
10	Assume that two 1.5mm thick steel sheets are being spot welded at a current of 5500A and current flow time t=0.15s. Using electrodes 6mm in diameter, estimate the amount of heat generated and its distribution in the weld zone.	Understand	AME808.15

	Use an effective resistance of 250μΩ.		
11	Can we join dissimilar materials? If so give those process names and describe the basic principle of working.	Remember	AME808.15
12	Which welding technology out of TIG/MIG welding uses non consumable electrode? Explain that process with neat diagram.	Remember	AME808.16
13	A plate 200 mm wide and 20 mm thick is to be welded to another plate by means double parallel fillet. The plate are subjected to a static load of 80 KN. Find the length of the weld is the permissible shear stress in the weld does not exceed 55 MPa	Remember	AME808.16
14	The voltage length characteristic of a DC arc is given by V=20+30l, where „V" is the arc voltage and „l" is the length of arc in cm. Determine the open circuit voltage and short circuit current for arc lengths ranging from 3 to 5mm and current ranging from 200 to 400Amp during welding operation.	Remember	AME808.16
15	A 100 mm dia solid shaft is welded to a flat plate by 20 mm fillet weld. Find the maximum torque that the welded joint can sustain if the maximum shear stress intensity in the weld material is not to exceed 80 MPa.	Understand	AME808.17
16	During welding, the parent metal in HAZ undergoes certain changes, Discuss these changes.	Understand	AME808.17
17	A 50 mm dia solid shaft is welded to a flat plate by 10 mm fillet weld. Find the maximum torque that the welded joint can sustain if the maximum shear stress intensity in the weld material is not to exceed 80 MPa.	Understand	AME808.17
18	A plate 100 mm wide and 10 mm thick is to be welded to another plate by means double parallel fillet. The plate are subjected to a static load of 80 KN. Find the length of the weld is the permissible shear stress in the weld does not exceed 55 MPa	Remember	AME808.18
19	Which one of the following NDT would be used to examine a completed weld for surface defects: (a) Ultrasonics (b) Dye-penetrate (c)Radiography (d) Acoustics. Explain that process.	Remember	AME808.18
20	Which of the following would help to reducedistortion? (a) Concentration of welding to onearea (b) Increasing the input of weldingheat (c) Use of singleV-preparation (d) Use of welding sequence Justify youranswer.	Remember	AME808.18

Prepared By:
MR. VKVS KrishnamRaju

HOD, ME