CAREER DEVELOPMENT CENTRE

DIT UNIVERSITY
IMAGINE ASPIRE ACHIEVE

Date: 6th January 2020

Subject: Schedule for Technical Training – EDM

Attention: Students of B.Tech 6th & 8th Semester (ME & ME-AE)

The students are hereby informed that the Technical Training – EDM will be starting from **13th January 2020** and will continue throughout the semester for the students of B.Tech 6th & 8th Semester (ME & ME-AE).

Note: It is mandatory for all the above-mentioned students to attend the training.

Gaurav Singh
Head- CDC

Head -CDC
Career Development Cell
DIT University, Dehradun

Registrar
DIT University, Dehradun

To:

- All Deans / Directors
- HoDs
- Head CDC

With the request to bring the above to the notice of the students

Copy to:

- Chairman
- Chancellor
- Vice Chancellor
- Pro Vice Chancellor

For information please

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VAT- 82: Technical Training-EDM for B.Tech-ME &ME-AE Students

Course: -B.Tech- ME & ME-AE-3rd & 4th Year

Venue: -Chanakya Seminar Hall

Organized By- Department of Mechanical Engineering

Date: -13th January -20th March 2020

Duration: -45 Hours

Timings: -2:00 PM to 4:00 PM

Organized By: Career Development Centre, DIT University

Conducted By: Dr. Nalin Somani (Department of Mechanical Engineering, DIT University)

Electrical discharge machining (EDM) is a popular nonconventional machining approach that is often used on hard materials. This method is popular because of the fact that EDM can machine any materials irrespective of its hardness. Modern engineering materials that are deployed in extreme conditions are often shaped or manufactured by EDM process. Other conventional or nonconventional manufacturing methods can be combined with EDM to create a more uniform and balanced machining setup. Hybrid or combined approaches of machining can overcome the inherent drawbacks of EDM process. The performance of machining can improve significantly when other manufacturing processes are incorporated with conventional EDM.

Training Objective:

- The primary objective of this Training class is to teach participants Finite Element Analysis.
- Thus, upon completion of this course, participants will be able to set up, solve, and diagnose their own Structural Analyses.
- This is a problem-based training where the focus will be on understanding what's under the black box so as to move beyond garbage-in, garbage-out.
- Learners practice using a common solution approach to problems involving different physics: structural mechanics, fluid dynamics and heat transfer.
- Textbook examples are solved to help understand the fundamental principles of finite-element analysis.
- Then these principles are applied to simulate real-world examples in the tool including a bolted rocket assembly and a wind turbine rotor.
- By working through examples in a leading simulation tool that professionals use, students learn to move beyond button pushing and start thinking like an expert.

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- This training provides learners with the most flexible learning environment possible.
- It can be accessed from multiple devices which makes it easy to learn on the go.

Training Overview:

- EDM is a finite element analysis (FEA) tool that enables you to analyze complex product architectures and solve difficult mechanical problems.
- You can use EDM to simulate real world behavior of components and sub-systems and customize it to test design variations quickly and accurately.

Requisite:

The program is designed for students or professionals who are:

- Having a Diploma, BE / B.Tech or equivalent in domains such as Automotive, Mechanical, EEE, ECE, Instrumentation, Mechatronics, and Aeronautics.
- Designing enthusiasts (No academic qualification mandatory)
- Working in industries such as Automotive, Auto component, Design, Manufacturing, etc.

Training Outcomes:

- The students developed to learn and apply new theories, concepts, and methods.
- Developed extensive knowledge and understanding of a wide range of computer modelling and simulation software.
- Have learnt to Identify, formulates, and solves engineering problems.
- Apply knowledge of mathematics, science, and engineering.
- Have learnt to Design and conduct experiments, as well as to analyze and interpret data.
- Mathematical models underlying simulations
- Verification and validation of simulations including checking against hand calculations
- Built an approach within engineering analysis and simulations like an expert

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COURSE FILE

NAME OF COURSE: VAT-EDM

COURSE CODE: ME332

BRANCH: ME

SESSION: 2021-22

NAME OF FACULTY: Dr. Nalin Somani

NAME OF COURSE COORDINATOR: Dr. Nalin Somani

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CONTENTS

Course Details

Subject Code: ME332

Marks: 100

Number of Lecture hours per week: 0

Credits: 0

L-T-P: 0-0-2

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DIT UNIVERSITY
IMAGINE ASPIRE ACHIEVE

Vision & Mission statements of department

Vision of Department

- To established a recognized centre for providing quality technical education.
- To emerge as a research centre addressing the problems related to mechanical engineering.
- To fulfil the requirements of the industry and the society.
- To produces engineers, who prove to be prolific to the industries to attain new heights.

Mission of Department

M1: To impart quality education to the graduates to enhance their skills and capacity that makes them competitive mechanical engineers globally.

M2: To develop research facilities that stimulates faculty, staff and students with opportunities to utilize the technical knowledge.

M3: To develop research facilities in order to contribute in the knowledge creation for serving betterment of society.

M4: To provide the students with academic environment of excellence, leadership, ethical guidelines and lifelong learning needed for a bright career.

PEO, PO and PSO

Program Educational Objectives (PEOs)

PEO1: To provide foundation in the mathematical, scientific and engineering fundamentals necessary for professional developments of students in mechanical engineering.

PEO2: To provide ability to analyze, interpret apply engineering proficiency for the solutions of real life mechanical engineering problem.

PEO3: To develop skills to analyze and design the mechanical system used in industries for better employability.

PEO4: To develop the leadership and innovation qualities among students for lifelong learning.

PEO5: To instill the professional attitude towards team work and multidisciplinary approach to solve the social problems.

Program Outcomes (PO): - {For B. Tech Program}

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO 6: The Engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: Graduate can able to design mechanical components as per the desired specifications and requirements.

PSO2: Apply the knowledge of different manufacturing technologies in various industries.

PSO3: Execute the knowledge of thermal system design in process industries and power systems.

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TIME TABLE ODD SEM 2021-22:

Name of the Faculty: Dr. Nalin Somani **Designation of the Faculty: Assistant Professor**

Periods Days	1st 9:00-	2nd 10:00-	3rd 11:00-	4th 12:00-	12:55 –	5th 14:00-	6th 15:00-	7th 16:00-
MONDAY						ME 332 (P)		
TUESDAY								
WEDNESDAY								
THURSDAY								
FRIDAY								
SATURDAY								

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Course Category	Course Code	Course Title	L	T	P	Credit
VAT	ME 332	Electric Discharge Machine	0	0	2	0

Syllabus Content:

Module 1: Introduction to manufacturing process, types of manufacturing process, limitations of conventional machining process, need of non-conventional machining processes, classification of non-conventional machining processes. **(1 L)**

Module 2: Introduction of Electric Discharge Machining (EDM), Principle of EDM machine, advantages and limitations of EDM machine, applications of EDM machine

(1 L)

Module 3: Demonstration of EDM machine and its various parts, electrode materials, work-piece materials.

(2 P)

Module 4: Calculation of Material Removal Rate (MRR) & Tool Wear Rate (TWR) (if tool material is harder than work-piece material). **(3 P)**

Module 5: Calculation of Material Removal Rate (MRR) & Tool Wear Rate (TWR) (if tool material is softer than work-piece material).

(3 P)

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LESSON PLAN	
Course: EDM	**Faculty Name:** Dr. Nalin Somani

EDM LESSON PLAN

SESSION 1	• Introduction to manufacturing process • Types of manufacturing process • Limitations of conventional machining process • need of non-conventional machining processes • Classification of non-conventional machining processes
SESSION 2	• Introduction of Electric Discharge Machining (EDM) • Principle of EDM machine • Advantages and limitations of EDM machine • Applications of EDM machine
SESSION 3	• Demonstration of EDM machine and its various components • Electrode and work-piece material and their properties.
SESSION 4	• Calculation of Material Removal Rate (MRR) & Tool Wear Rate (TWR)

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Evaluation Scheme and Guidelines

Evaluation Instrument	Weightage
Mid Term Test	
Class test/ Assignments	
Laboratory	100%
Quiz	
Final Exam	

NOTES & RESULTS

INTRODUCTION

The main purpose of manufacturing processes is to transform materials into useful products. In the course of these operations, energy resources are consumed and the usefulness of material resources is altered. Each of these effects can have significant consequences for the environment and for sustainability, particularly when the processes are practiced on a very large scale. Accompanying the development of mechanical/manufacturing industry, the demands for alloy materials having the properties of high impact resistance, toughness and hardness are increasing. Such materials are difficult to be machined by traditional machining process. Therefore, non-traditional machining processes including ultrasonic machining, electrochemical machining, electro discharge machine (EDM) etc. are applied to machine such difficult to machining of materials. WEDM method with a thin cutting wire as an electrode transforms electrical energy to thermal energy for cutting such materials. With these methods, alloys, conductive ceramics and aerospace materials can be machined irrespective to their toughness and hardness. Thereafter, wire electro discharge machining is capable of producing a precise and fine, wear resistant and corrosion resistance surface.

Fig. EDM Machine, MED LABS

ADVANTAGES OF EDM PROCESS

- As continuously travelling wire is used as the negative electrode, so electrode fabrication is not required as in EDM.
- There is no direct contact between the work piece and the wire, eliminating the mechanical stresses during machining.
- EDM process can be applied to all electrically conducting metals and alloys irrespective of their melting points, hardness, toughness or brittleness.
- Users can run their work pieces over night or over the weekend unattended.

DISADVANTAGES OF EDM PROCESS

- High capital cost is required for EDM process.
- There is a problem regarding the formation of recast layer.
- WEDM process exhibits very slow cutting rate.

Chapter-3
RESULT AND DISCUSSION

Chapter four is generally discuss the results obtained throughout the experimental research analysis on the material removal rate (MRR) and Tool wear rate (TWR) after a period of machining process.

➤ DATA COLLECTION

Table 3.1: Data collection

EXP	ELECTRODE	MASS ELECTRODE BEFORE (g)	MASS ELECTRODE AFTER (g)	MASS W/P BEFORE (g)	MASS W/P AFTER (g)	TIME
1	Cooper	11.1402	11.1266	11.1402	142.7020	25m 17s
2	Cooper	11.2121	11.2082	143.4450	143.1936	25m 20s
3	Cooper	11.1260	11.1237	143.2495	143.0096	25m 46s
4	Cooper	11.1217	11.1143	142.8812	142.6335	25m 33s
5	Cooper	11.1237	11.1220	142.2405	141.9867	25m 3s
6	aluminum	10.5560	10.3952	143.0000	142.9462	18m 58s
7	aluminum	3.1011	3.0742	142.9121	142.8357	18m 33s
8	aluminum	10.3952	10.2345	142.0301	141.9393	18m 31s
9	aluminum	3.0145	2.9847	142.7999	142.221	18m 49s
10	aluminum	10.2345	10.0761	143.0359	142.9481	18m 45s
11	Brass	3.1350	3.1033	142.5420	142.4239	2h 58s
12	Brass	10.4444	10.2757	142.9789	142.4239	2h 1s
13	Brass	3.1033	3.0754	143.0378	142.9099	1h 52m 43s
14	Brass	10.8689	10.7212	143.0000	142.6781	2h 2m 4s
15	Brass	3.0754	3.0500	142.1720	142.0460	1h 51m 17s
			Total time			13h 24m 3s

❖ ANALYSIS OF MATERIAL REMOVAL RATE (MRR)

MRR is the rate at which material is removed from the workpiece. Electric sparks are produced between the tool and workpiece during the machining process. Each spark produces a tiny crater and thus erosion of material is caused.
The MRR is defined as the ratio of the difference in weight of the workpiece before and after machining to the density of the material and the machining time.

➢ Data Collection Of Material Removal Rate (MRR)

The data from the experiment is collect and put into table 3.2, 3.3 and 3.4 in order to analyze the material removal rate (MRR).

Table 3.2: Data collection by using copper electrode

Copper	1st	2nd	3rd	4th	5th
Before (g)	142.9590	143.4450	143.2495	142.8812	142.2405
After (g)	142.7020	143.1936	143.0096	142.6335	141.9867
Different Mass (g)	0.2570	0.2514	0.2399	0.2477	0.2538
Time	25m 17s	25m 20s	25m 46s	25m 33s	25m 3s

Table 3.3: Data collection by using brass electrode

Brass	1st	2nd	3rd	4th	5th
Before (g)	142.5420	142.9789	143.0378	143.0000	142.1770
After (g)	142.4239	142.8467	142.9099	142.6781	142.0460
Different Mass (g)	0.1181	0.13211	0.1279	0.13219	0.131000
Time	2h 58s	2h 1s	1h 52m 43s	2h 2m 4s	1h 51m 17s

Table 3.4: Data collection by using aluminum electrode

Aluminum	1st	2nd	3rd	4th	5th

Before (g)	143.0000	142.9121	142.0301	142.7999	143.0359
After (g)	142.9462	142.8357	141.9393	142.221	142.9481
Different Mass (g)	0.0538	0.0764	0.0908	0.0778	0.0878
Time	18m 58s	18m 33s	18m 31s	18m 49s	18m 45s

➢ <u>Calculation of Material Removal Rate (MRR)</u>

MRR (gms/min) = (w_{jb} - w_{ja}) / t

MRR (mm^3/min) = (w_{jb} - w_{ja})*1000 / (density*time)

MRR (mm^3/min) =(536.630-531.570)*1000/(8.05*20)=31.73 mm^3/min

Where
w_{jb}- weight of the workpiece before machining
w_{ja}- weight of the workpiece after machining

Table 3.5: Observation

S.NO.	Voltage (V) V	Current (I) A	Pulse Time (t_{on}) ()	Initial Wt. (w_{jb}) gms	Final Wt. (w_{ja}) gms	Weight Loss (w_{jb} - w_{ja})	Machining Time (t) mins
1	60	20	12	563.630	531.570	5.06	20
2	60	20	12	80.91			20

❖ ANALYSIS OF TOOL WEAR RATE (TWR):

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Tool wear is an important factor because it affects dimensional accuracy and the shape produced. Tool wear is related to the melting point of the materials. Tool wear is affected by the precipitation of carbon from the hydrocarbon dielectric on the electrode surface during sparking. TWR is expressed as the ratio of the difference of weight of the tool before & after machining to the machining time and density of the material. That can be solved by this equation.

TWR (mm3 /min) = **($W_{tb} - W_{ta}$ /p.t * 1000)**

TWR (mm^3/min) =(80.91-)*1000/(8.96*20)

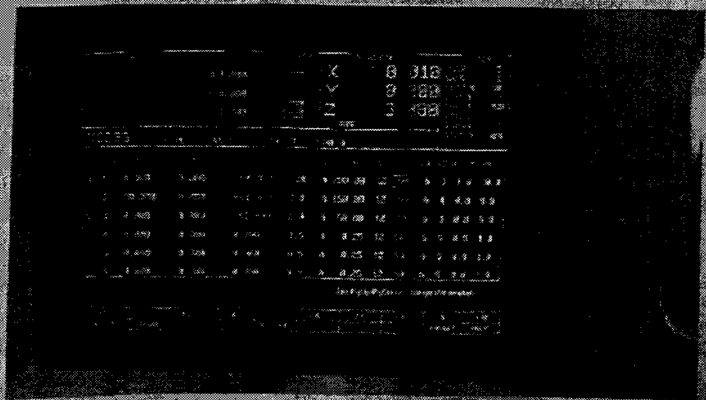
Where,

W_{tb}= Weight of the tool before machining (gm)

W_{ta}= Weight of the tool after machining (gm) t = Machining time (minute)

ρ = **Density of copper (8.96 gm/cm^3)**

Electronic balance was used for weighting the workpiece and tool, before and after machining. It had a weighting capacity of 210 grams and can accurately measure the weight of 0.001 gram.



Chapter-4

❖ CONCLUSION

For high discharge current, copper electrodes show highest MRR, whereas Brass gives good surface finish and normal MRR. Since EDM is a thermal method, special attention must be paid to surface integrity. Surface and subsurface damage may be induced owing to thermal fatigue or to the material recast on the surface after removal. The MRR could be improved by carrying out research on electrode design, process parameters, EDM variations, powder mixed dielectric and electrically insulated electrodes. It is found that the basis of controlling and improving MRR mostly relies on empirical methods. This is largely due to stochastic nature of the sparking phenomenon involving both electrical and non-electrical process parameters along with their complicated interrelationship.

◆ Applications

➢ Prototype production

The EDM process is most widely used by the mold-making, tool, and die industries, but is becoming a common method of making prototype and production parts, especially in the aerospace, automobile and electronics industries in which production quantities are relatively low. In sinker EDM, a graphite, copper tungsten, or pure copper electrode is machined into the desired (negative) shape and fed into the workpiece on the end of a vertical ram.

➢ Coinage dies making

FIG.4.1

Master at top, badge die work piece at bottom, oil jets at left (oil has been drained). Initial flat stamping will be "dapped" to give a curved surface.

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For the creation of dies for producing jewelry and badges, or blanking and piercing (through use of a pancake die) by the coinage (stamping) process, the positive master may be made from sterling silver, since (with appropriate machine settings) the master is significantly eroded and is used only once. The resultant negative die is then hardened and used in a drop hammer to produce stamped flats from cutout sheet blanks of bronze, silver, or low proof gold alloy. For badges these flats may be further shaped to a curved surface by another die. This type of EDM is usually performed submerged in an oil-based dielectric. The finished object may be further refined by hard (glass) or soft (paint) enameling, or electroplated with pure gold or nickel. Softer materials such as silver may be hand engraved as a refinement.

FIG.4.2

EDM control panel (Hansvedt machine). Machine may be adjusted for a refined surface (electropolish) at end of process.

- Small whole drilling

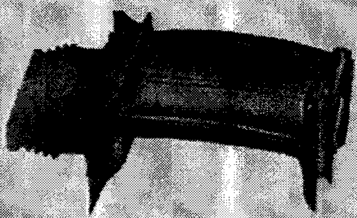

FIG.4.3

A turbine blade with internal cooling as applied in the high-pressure turbine.

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FIG.4.4

Small whole drilling EDM machines.

Small hole drilling EDM is used in a variety of applications.

On wire-cut EDM machines, small hole drilling EDM is used to make a through hole in a workpiece in through which to thread the wire for the wire-cut EDM operation. A separate EDM head specifically for small hole drilling is mounted on a wire-cut machine and allows large hardened plates to have finished parts eroded from them as needed and without pre-drilling.

Small hole EDM is used to drill rows of holes into the leading and trailing edges of turbine blades used in jet engines. Gas flow through these small holes allows the engines to use higher temperatures than otherwise possible. The high-temperature, very hard, single crystal alloys employed in these blades makes conventional machining of these holes with high aspect ratio extremely difficult, if not impossible.

Small hole EDM is also used to create microscopic orifices for fuel system components, spinnerets for synthetic fibers such as rayon, and other applications.

There are also stand-alone small hole drilling EDM machines with an x–y axis also known as a super drill or hole popper that can machine blind or through holes. EDM drills bore holes with a long brass or copper tube electrode that rotates in a chuck with a constant flow of distilled or deionized water flowing through the electrode as a flushing agent and dielectric. The electrode tubes operate like the wire in wire-cut EDM machines, having a spark gap and wear rate. Some small-hole drilling EDMs are able to drill through 100 mm of soft or through hardened steel in less than 10 seconds, averaging 50% to 80% wear rate. Holes of 0.3 mm to 6.1 mm can be achieved in this drilling operation. Brass electrodes are easier to machine but are not recommended for wire-cut operations due to eroded brass particles causing "brass on brass" wire breakage, therefore copper is recommended.

- Metal disintegration machining

Several manufacturers produce MDM machines for the specific purpose of removing broken tools (drill bits, taps, bolts and studs) from work pieces. In this application, the process is termed "metal disintegration machining" or MDM. The metal disintegration process removes only the center of the tap, bolt or stud leaving the hole intact and allowing a part to be reclaimed.

- Closed loop manufacturing

  Closed loop manufacturing can improve the accuracy and reduce the tool cost.

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Advantages and disadvantages :

Advantages of EDM include machining

- Complex shapes that would otherwise be difficult to produce with conventional cutting tools.
- Extremely hard material to very close tolerances.
- Very small work pieces where conventional cutting tools may damage the part from excess cutting tool pressure.
- There is no direct contact between tool and work piece. Therefore, delicate sections and weak materials can be machined without perceivable distortion.
- A good surface finish can be obtained; a very good surface may be obtained by redundant finishing paths.
- Very fine holes can be attained.
- Tapered holes may be produced.
- Pipe or container internal contours and internal corners down to R .001".

Disadvantages of EDM include:

- Difficulty finding expert machinists.
- The slow rate of material removal.
- Potential fire hazard associated with use of combustible oil based dielectrics.
- The additional time and cost used for creating electrodes for ram/sinker EDM.
- Reproducing sharp corners on the workpiece is difficult due to electrode wear.
- Specific power consumption is very high.
- Power consumption is high.
- "Overcut" is formed.
- Excessive tool wear occurs during machining.

Assessments details:

VAT EXAMINATION (EDM LAB)

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Session 2021-2022

Course: B.Tech Year: III Department: Mechanical Engg. Roll No. ………………

SAP ID……………………

Q 1-25…..3 MARKS Total Marks..100

Q1. In conventional machining techniques which type of energy has role in material removal from the workpiece?

a. Thermal Energy. b. Mechanical Energy c. Kinetic Energy d. Electrical Energy

Q2. What is the range if spark gap in EDM technique?

a. 0.5-5 mm. b. 0.05-0.5 mm c. 0.005-0.05mm. d. 0.0005-0.005mm

Q3. In EDM, temperature developed during machining is of the order of

a. 2000°C. b. 10000° C. c. 4000° C d. 20,000°C

Q4. Which of the following material will not be able to machine in EDM?

a. Hardened Steel b. Glass Fiber Epoxy Reinforced Composite c. Tungsten Carbide d. Carbon Fiber Epoxy Reinforced Composites

Q5. Which of the following is the non conventional machining technique?

a. Lancing b. Tapping c. Ultrasonic Machining d. None of the above

Q6. Which of the following set of variables are used as process parameters in EDM?

a. Voltage, Hardness, Pulse on Time
b. Pulse off Tome, Pulse on Time. Voltage
c. Hardness, Surface Finish, Material Removal Rate
d. Current , Resistance, Hardness

Q7. Rolling is_______type of manufacturing.

a. Negative b. Positive c. Additive d. Zero

Q8. In conventional machining techniques, ______ tool and _____workpiece are used.

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a. Soft, Soft b. Hard, Soft c. Soft, Hard d. Hard, Soft

Q9. In Non conventional machining, chips are in the form of

a. Macroscopic Structure b. Microscopic Structure c. Both (a) and (b) d. Nano Structure

Q10. EDM is a process of machining using

a. Continuous flow of current between two electrode
b. Series of spark occurring between two electrode
c. Arcing process occurring between two electrode
d. Both (a) and (c)

Q11. Dielectric fluid should have following properties:

a. Low flash point & high viscosity b. High viscosity & chemically neutral

c. Good wetting capacity & low flash point d. All of the above

Q12. Which type of holes can be produced using EDM?

a. Taperd b. Irregular c. Curved d. All of the above

Q13. How much percentage of burr is produced during EDM process?

a. 20% b. 0% c. 35% d. 40%

Q14. Which of the following shapes can be produced using EDM technique?

a. Complex shapes b. Simple shapes c. Micro structures d. All of the above

Q15. In wire EDM, tool is in the form of

a. Thick cylinder
b. Wire
c. Both (a) and (b)
d. None of the above

Q16. Which of the following is not true in case of EDM technique?

a. Material removal takes place due to melting and vaporization
b. Erosion takes place both on the workpiece and the tool
c. Spark gap between tool and workpiece is controlled by servo mechanism
d. Machining takes place in presence of electrolyte

Q17. Duty cycle in EDM process is the ratio of

a. Pulse off time and pulse on time
b. Pulse on time and pulse off time
c. Pulse on time and total cycle time
d. Total cycle time and pulse off time

Q18. Limitation of EDM technique is

a. High tool wear rate b. Low cutting force c. Low material removal rate d. None of the above

Q19. Which of the following materials is/are used for EDM technique?

a. Brass b. Copper c. Graphite d. All of the above

Q20. In EDM process the metal removal is carried out by

a. Fracture in the work material b. Electrolysis c. Melting & vaporization d. None of the above

Q21. In which type of industries, EDM process can be used for making products?

a. Aerospace b. Automobile c. Medical d. All of the above

Q22. Example of Dielectric Fluid is

a. Kerosene b. EDM Oil c. Both (a) and (b) d. None of the above

Q23. Performance parameters in EDM is/are

a. Gap Voltage
b. Surface Finish
c. Peak Current
d. All of the above

Q24. In EDM, Reverse Polarity stands for

a. Tool-Negative charge and Workpiece- Positive charge
b. Tool-Positive charge and Workpiece- Negative charge
c. Tool- Neutral and Workpiece- Negative charge
d. None of the above

Q25. In rough machining using EDM technique, ___ Current and ___ Gap Voltage are used.

a. Low , Low b. High, Low c. High, High d. Low, High

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Subjective Questions: Question 1- 5 Marks, Question 2 and 3- 10 Marks respectively

Q1. What are the differences between traditional and Non traditional machining?

Q2. What is EDM Techniques? Explain its working principle with a block diagram.

Q3. What are various process and performance parameters used in EDM technique? Explain the procedure of calculating Material removal rate and Tool wear rate in EDM process.

Annexure - II

Value added course Details (Academic Year: 2019-20)

VAT Course Name: Electrical Discharge Machining Training

VAT Code: VAT 82

Duration in Hours: 45

Number of Students Enrolled: 124

Number of Students Completed: 120

Grades: G= GOOD ; S = Satifactory ; P = Poor ; W = Withdraw

Student ID	Student Name	Program/Course	Year	Passing Grade
180113904	ASHISH LOHANI	BTME-AE	3rd Year	S
180106916	ABHISHEK SINGH	BTME	3rd Year	S
180106903	SANMOHAN DAS	BTME	3rd Year	G
170106033	DEEPAK PRAJAPATI	BTME	3rd Year	S
170106030	TARUN BHATT	BTME	3rd Year	G
180106914	MADHUR PATARI	BTME	3rd Year	S
170113007	DHEERAJ ADHIKARI	BTME-AE	3rd Year	S
180106908	MEGHA RAI	BTME	3rd Year	P
170113015	KUNAL SINGH	BTME-AE	3rd Year	G
160106029	PUSHPENDRA KUMAR SAHU	BTME	3rd Year	G
170106028	MOHAMMAD FAISAL	BTME	3rd Year	S
180106912	SANGAM RAMOLA	BTME	3rd Year	S
170106020	ARSH KUMAR	BTME	3rd Year	S
170113032	MITHANSHU SHARMA	BTME-AE	3rd Year	S
170106011	SHIVALAY SAXENA	BTME	3rd Year	S
170106080	AVINASH KUMAR SONU	BTME	3rd Year	S
170106048	GAUTAM PUNETHA	BTME	3rd Year	G
170106062	JAYESH ARORA	BTME	3rd Year	S
170113014	ARBAZ KHAN	BTME-AE	3rd Year	G
170106063	SHUBHAM KUMAR	BTME	3rd Year	S
170113012	SHIVAM KUMAR	BTME-AE	3rd Year	S
170106094	NITIN BALAYAN	BTME	3rd Year	P
180106913	VIPUL KULASARI	BTME	3rd Year	G
170113025	SIDDHARTH SHRIWASTWA	BTME-AE	3rd Year	G
170106075	BIPIN SINGH BHAT	BTME	3rd Year	S
170106023	HARSHIT KUMAR	BTME	3rd Year	S
170106017	AISHWARY GUPTA	BTME	3rd Year	S
170113001	VISHESH MITTAL	BTME-AE	3rd Year	S
170106077	ANMOL TYAGI	BTME	3rd Year	S
170106032	DHIRAJ KUMAR	BTME	3rd Year	S
170106054	GOVINDA KUMAR	BTME	3rd Year	G
170106036	AKSHAT JAIN	BTME	3rd Year	P
170113028	SUMIT KUMAR	BTME-AE	3rd Year	G
170106038	MIHIR LAKHERA	BTME	3rd Year	S
170113031	RAGHAV RAINA	BTME-AE	3rd Year	S
170106049	RAHUL DESWAL	BTME	3rd Year	S
170113011	HARSHIT BELWAL	BTME-AE	3rd Year	G
170106025	AKASHJYOTI BARMAN	BTME	3rd Year	G
170106089	SAMEER KUMAR	BTME	3rd Year	S
170106044	OMAR MASOOD	BTME	3rd Year	S

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170106084	TANMAY ANIL KADAM	BTME	3rd Year	P
170113033	DEVANSH SHUKLA	BTME-AE	3rd Year	S
170113023	SREJANSH SRIVASTAVA	BTME-AE	3rd Year	S
170106056	AADARSH CHOUDHARY .	BTME	3rd Year	S
170106026	OMPRAKASH .	BTME	3rd Year	G
170113010	VYOM RASTOGI	BTME-AE	3rd Year	S
170106035	MOHIT BHANDARI	BTME	3rd Year	G
170106006	SAURABH CHAND	BTME	3rd Year	S
170106087	KARTIK KAUSHAL	BTME	3rd Year	S
170113013	PULKIT KULYAL	BTME-AE	3rd Year	S
170106086	PURU SRIVASTAVA	BTME	3rd Year	G
170106078	ABHISHEK ANAND .	BTME	3rd Year	G
170113008	RAASHI TANEJA	BTME-AE	3rd Year	S
170106008	ABHISHEK VERMA	BTME	3rd Year	S
170106083	YUDHISHTAR CHAUHAN	BTME	3rd Year	S
180106901	NISHANK KAUSHIK	BTME	3rd Year	S
180106904	JATIN PANDEY	BTME	3rd Year	S
170106053	ADITYA PRATAP BHANDARI	BTME	3rd Year	S
170106069	ANKUR PRATAP SINGH	BTME	3rd Year	G
170113027	AKASH SINGH	BTME-AE	3rd Year	S
180106900	ANKIT RANA	BTME	3rd Year	G
170106029	HARISH KUMAR	BTME	3rd Year	S
170113020	SATYAM KUMAR	BTME-AE	3rd Year	S
170106074	MIT RITA GOSWAMI	BTME	3rd Year	S
170106050	NITESH TRIPATHI	BTME	3rd Year	G
170106013	PANKAJ RAWAT	BTME	3rd Year	G
170106071	DEV GOSWAMI	BTME	3rd Year	S
170113003	RAJAT GUPTA	BTME-AE	3rd Year	S
170113017	NITISH KASHYAP	BTME-AE	3rd Year	S
170106012	SHIV SABLOK	BTME	3rd Year	S
180113900	HARSH TEOTIA	BTME-AE	3rd Year	S
170113009	AMOGH UNIYAL	BTME-AE	3rd Year	S
170106090	SAHIL KUMAR TIWARI	BTME	3rd Year	G
170106088	ALOK RANJAN SINGH	BTME	3rd Year	S
170106102	AAKASH KANAKHARA	BTME	3rd Year	G
170106081	ADITYA PANCHAL	BTME	3rd Year	S
170106002	HIMANSHI BISHT	BTME	3rd Year	S
170106034	SAURABH SINGH RAUTELA	BTME	3rd Year	S
170106058	MANISH SINGH GARIA	BTME	3rd Year	G
170106021	SHASHANK BAHUGUNA	BTME	3rd Year	G
170106010	SANSKAR SINGH NEGI	BTME	3rd Year	S
170106057	ANIRUDH RAUTELA	BTME	3rd Year	S
180113901	ABHED PRASAD	BTME-AE	3rd Year	S
170106093	AYUSH CHAKARBORTHY	BTME	3rd Year	S
170113029	MANAV SIKKA	BTME-AE	3rd Year	S
170113004	HARSH KUMAR KHARWAR	BTME-AE	3rd Year	S
170106019	UMANG NAGAR	BTME	3rd Year	G
170106076	NISCHAY PALIWAL	BTME	3rd Year	S
180113902	PRAKHAR AGGARWAL	BTME-AE	3rd Year	G
170106015	ADITYA KUMAR	BTME	3rd Year	S

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170106079	SACHIN KUMAR	BTME	3rd Year	S
170106047	AADITYA SINGH .	BTME	3rd Year	S
170106073	HARSH GURURANI	BTME	3rd Year	G
180106905	SUDERSHAN CHAUHAN	BTME	3rd Year	G
180106915	HIMANSHU KUMAR	BTME	3rd Year	S
170106031	PANKAJ MANRAL	BTME	3rd Year	S
170106085	SHUBHAM UPADHYAY	BTME	3rd Year	S
170106022	CHETAN PANDEY	BTME	3rd Year	S
170106082	ABHIMANYU CHOUDHARY	BTME	3rd Year	S
170106070	ADBHUT TRIPATHI	BTME	3rd Year	S
170106007	AKSHAT THAPLIYAL	BTME	3rd Year	G
170106067	SAGAR VERMA .	BTME	3rd Year	S
170106003	ROSHAN JOSHI	BTME	3rd Year	G
170106001	ADITI MISRA	BTME	3rd Year	S
170106066	PIYUSH YADAV	BTME	3rd Year	S
170106064	ANUJ P.S SIKARWAR	BTME	3rd Year	S
170106043	PARAS TARAGI	BTME	3rd Year	G
170113018	RAJHANS PRASAD	BTME-AE	3rd Year	G
170106055	SHIVANSH PRATAP SINGH CHAUHAN	BTME	3rd Year	S
170106045	DEEPAK SINGH	BTME	3rd Year	S
170106052	ABHISHEK NEGI	BTME-AE	3rd Year	S
170106040	ANSHUL RAWAT	BTME	3rd Year	S
170113006	SIDDHARTH PATHANIA	BTME-AE	3rd Year	S
170113016	MAYANK NAUDIYAL	BTME-AE	3rd Year	S
170106068	RAHUL GURUNG	BTME	3rd Year	G
170113005	MAYANK RAUTELA	BTME-AE	3rd Year	S
170106042	PRATEEK SEMWAL	BTME	3rd Year	G
170113002	SUNDARAM DHAR DWIVEDI	BTME-AE	3rd Year	S
170106024	PUNIT SINGH	BTME	3rd Year	S
170106046	ANURAG PAL	BTME	3rd Year	S
180106911	RAYMON SINGH	BTME	3rd Year	G
170113021	MANGLAM RASTOGI	BTME-AE	3rd Year	G
170106092	ARYAN PANDEY	BTME	3rd Year	S
170106061	SAURABH BHATT	BTME	3rd Year	S

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