SUB: ADVANCED MANUFACTURING TECHNOLOGY(ME 702)

1. Rapid prototyping technology can be used for
a) cutting of plastic od
b) one transplantation in medical technology
c) crushing alloy steel
d) drilling operation in steel plate.

2. ECM is a kind of
a)mechanical process
b) thermoelectric process
c) electrochemical process
d) chemical process.

3. AJM cannot be efficiently used for machining
a)ceramic plate
b)boron carbide block
c)elastomer materials
d)mild steel plate.

4. CAPP is fully integrated with
a) CAD and CAM
b) Only CAD
c) only CAM
d) none of these.

5. For making a hole of 0·08 mm in diameter, the best process to use is
a) AJM
b) PAM
c) WJM
d) LBM.

6. Production flow analysis is a technique used in relation with
a) high speed machining
b) GT
c) reverse engineering
d) rapid prototyping.

7. PAM can be used for machining
a) electrically conductive material
b) electrically non-conductive material
c) both electrically conductive and non-conductive materials
d) none of these.

8. Diamond tools should be used for high speed machining of
a) a)cast iron jobs
b) b)mild steel jobs
c) c)aluminium jobs

d) d)carbide jobs.

9) Group technology brings together and organizes
a) Common parts, problems and tasks
b) Automation and tool production
c) Documentation and analysis
d) Parts and simulation analysis.

10) Which of the following materials cannot be machined by EDM ?

a)Steel
b)WC
c) Titanium
d) Glass.

11) As the stand-off distance increases, the depth of penetration in AJM

a) Increases
b) Decreases
c) Does not change
d) Initially increases and hen remains steady.

12) Keeping all the other parameters constant in AWJM
Abrasive water jet velocity increases with

a) Increasing traverse velocity of the job
b) Decreasing mass flow rate of the abrasive
c) Decreasing stand-off distance
d) Increasing mass flow rate of the abrasive.

13) Tool USM is generally made of
a) Glass
b) Ceramic
c) Carbides
d) Steel

14) Compared to conventional machining of metals. AWJM provides
a) higher MRR
b) Higher dimensional accuracy
c) better surface finish
d) all of these
e) none of these.

15) Production flow analysis is a technique used in relation to
a) assembly line balancing
b) group technology
c) automated inspection system
d) all of these.

16) Expert system is related to
   a) CMM
   b) CAD
   c) All
   d) CNC Machines.

17) The fundamental philosophy of CIM is
   a) Value engineering
   b) Reverse engineering
   c) Concurrent engineering
   d) Sequential engineering.

18) The mechanism of AGV is based on the principle of
   a) triangulation
   b) interferometry
   c) embedded wire guided method
   d) none of these.

19. MRR in ECM depends on
   a) hardness of work material
   b) atomic weight of work material
   c) thermal conductivity of work material
   d) ductility of work material.

20. Mechanics of material removal in EDM is
   a) melting and evaporation aided by cavitation
   b) mechanical cutting action
   c) melting
   d) electrolysis.

21. machining accuracy is obtained in
   a) PAM
   b) LBM
   c) EBM
   d) EDM.

22. In EBM process, the maximum material removal rate is
   a) 20 mm^3/min
   b) 30 mm^3/min
   c) 10 mm^3/min
   d) 40 mm^3/min.

23. The dielectric fluid is used in
   a) ECM
   b) USM
   c) AJM
   d) EDM.

24. Deep hole drilling of small diameter, say 0.2 mm is done with EDM by

selecting the tool material as

a) a)copper wire
b) b)tungsten wire
c) c)brass wire
d) d)tungsten carbide.

25. In USM process, the material removal rate will be higher for materials with

a) a)higher toughness
b) b)higher ductility
c) lower toughness
d) higher fracture strain

26.Diamond tools should be used for high speed machining of

a) cast iron jobs
b) mild steel jobs
c) aluminium jobs
d) carbide jobs.

27.Flexible Manufacturing System predominantly utilizes

a) Special purpose machines
b) Conventional machine tools
c) Turning centres
d) Machining centres.

28. Production Flow Analysis is a technique used in relation to

a) Assembly Line Balancing
b) Group Technology
c) Automated Inspe tion System
d) All of these.

29. During the execution of a CNC part program block NO20 GO2 X45.0 Y25.0 R5.0 the type of tool motion will be

a) circular Interpolation – clockwise
b) circular Interpolation – counterclockwise
c) linear Interpolation
d) rapid feed

30. In an NC machining operation, the tool has to be moved from point (5, 4) to point (7, 2) along a circular path with centre at (5, 2). Before starting the operation, the tool is at (5, 4). The correct G and N codes for this motion are

a) N010GO3X7.0Y2.0I5.0J2.0
b) N010GO2X7.0Y2.0I5.0J2.0
c) N010GO1X7.0Y2.0I5.0J2.0

d) N010GOOX7.0Y2.0I5.0J2.0

31. The tool of an NC machine has to move along a circular arc from (5, 5) to (10, 10) while performing an operation. The centre of the arc is at (10, 5). Which one of the following NC tool path command performs the above mentioned operation ?
a) N010 GO2 X10 Y10 X5 Y5 R5
b) N010 GO3 X10 Y10 X5 Y5 R5
c) N010 GO1 X5 Y5 X10 Y10 R5
d) N010 GO2 X5 Y5 X10 Y10 R5

32. NC contouring is an example of
a) continuous path positioning
b) point-to-point positioning
c) absolute positioning
d) incremental positioning

33. Match the following:
NC code Definition
P. M05 1. Absolute coordinate system
Q. G01 2. Dwell
R. G04 3. Spindle stop
S. G09 4. Linear interpolation
a) P-2, Q-3, R-4, S-1
b) P-3, Q-4, R-1, S-2
c) P-3, Q-4, R-2, S-1
d) P-4, Q-3, R-2, S-1

34. In a CNC program block, N002 GO2 G91 X40 Z40……,GO2 and G91 refer to
a) circular interpolation in counterclockwise direction and incremental dimension
b) circular interpolation in counterclockwise direction and absolute dimension
c) circular interpolation in clockwise direction and incremental dimension
d) circular interpolation in clockwise direction and absolute dimension

35. Numerical control _____
a) applies only to milling machines
b) is a method for producing exact number of parts per hour
c) is a method for controlling by means of set of instructions
d) none of the mentioned

36. Computer will perform the data processing functions in
a) NC
b) CNC
c) DNC

d) None of the mentioned

37. Control loop unit of M.C.U is always
a) a hardware unit
b) a software unit
c) a control unit
d) none of the mentioned

38. The repeatability of NC machine depends on
a) control loop errors
b) mechanical errors
c) electrical errors
d) none of the mentioned

39. Rotation about Z-axis is called
a) a-axis
b) b-axis
c) c-axis
d) none of the mentioned

40. Rotation of spindle is designated by one of the following axis:
a) a-axis
b) b-axis
c) c-axis
d) none of the mentioned

41. Non-Traditional machining is recommended when we need which of the following features?
a) Complex shapes
b) High surface quality
c) Low-rigidity structures
d) All of the mentioned

42. Non-Traditional machining can also be called as?
a) Contact Machining
b) Non-contact machining
c) Partial contact machining
d) Half contact machining

43.In which of the following industries, Non-traditional machining methods play an important role?
a) Automobile
b) Aerospace
c) Medical

d) All of the mentioned

44. Different classifications of Non-traditional machining based on source of energy are?
a) Mechanical
b) Thermal
c) Chemical and electro-chemical.
d) All of the mentioned

45. In mechanical machining, material is removed by _____
a) Erosion
b) Corrosion
c) Abrasion
d) Vaporization

46. Material in thermal machining is removed by which of the following means?
a) Vaporization
b) Melting
c) Electro-plating
d) All of the mentioned

47. Which of the following process comes under mechanical machining?
a) USM
b) EDM
c) LBM
d) PAM

48. Surface defects that may be occurred during thermal machining are?
a) Micro cracking
b) Heat affected zones
c) Striations
d) All of the mentioned

49. Sources used in thermal machining are?
a) Ions
b) Plasma
c) Electrons
d) All of the mentioned

50. Vacuum is the machining medium for?
a) LBM
b) WJM
c) EBM
d) None of the mentioned

51. In chemical machining is material removal takes by?
a) Chemical reaction
b) Erosion
c) Electron removal
d) None of the mentioned

52. An example of hybrid machining?
a) Ultrasonic Machining
b) Electron Beam Machining
c) Ultrasonic assisted electrochemical machining
d) Laser Beam Machining

Short answer type questions

1. Define automation in the context of manufacturing system. What are the benefits of automation?
2. State about fixed automation, programmable automation and flexible automation. Mention the characteristics of each of them.
3. What is FMS? State about various components of FMS.
4. With a neat sketch explain the working principle of AJM process. State about its various applications.
5. Describe USM process with an illustrative sketch. Name two important process parameters and show graphically how these process parameters influence the performance of this process.
6. Compare a closed loop NC system with open loop NC system.
7. Distinguish between NC and CNC machine.
8. Distinguish between positional and contouring control in a CNC machine tool.
9. Illustrate the concept of automation in the context of manufacturing system. State about the goals of automation. What is meant by fixed automation?
10. Give the basic idea about FMS. What are the different types of flexibilities in FMS? State about them.
11. Explain the back ground behind the emergence of non-conventional machining processes.

12. With a neat sketch describe working principle of any one of the following processes: i) WJM ii) USM iii) AWJM.
13. State about job shop production, batch production & mass production.
14. With the help of block diagram, explain open loop and closed loop control system.
15. Explain point to point control and continuous path in CNC control system.
16. Write about the different components/elements in FMS.
17. Explain the sequence of fabrication in Rapid prototyping.
18. What is concurrent engineering ?
19. Explain the concept of 'Reverse Engineering'. Under what circumstances is it recommended?
20. Mention the different types of flexibility in FMS.
21. Write a short note on group technology (GT) (or, parts family manufacturing)
22. Write about the benefits of GT.
23. State about GT cells and types of GT layouts.
24. What is production flow analysis? State about its importance.
25. What is a project shop?
26. Distinguish between open loop and closed loop systems (/controls). Give illustrative sketches.
27. State the background behind the development of non-traditional (non-conventional) machining processes.
28. Explain the concept and need for a postprocessor as used in computer assisted part programming systems such as APT.
29. What is LASER ? Describe the various types of LASER.
30. State the characteristics and function of dielectric fluid used in EDM.
31. What is electrolysis? How is it used in Electrochemical Machining (ECM) process ?

Long answer type questions

1. With a neat sketch explain the basic principle of AJM. State about its various applications and limitation. . Name important process parameters of AJM process and discuss about the influence of these parameters on performance of this process.

2. With a neat sketch of the set up explain WJM process. State about its various applications. Mention about the materials preferred for the nozzle.

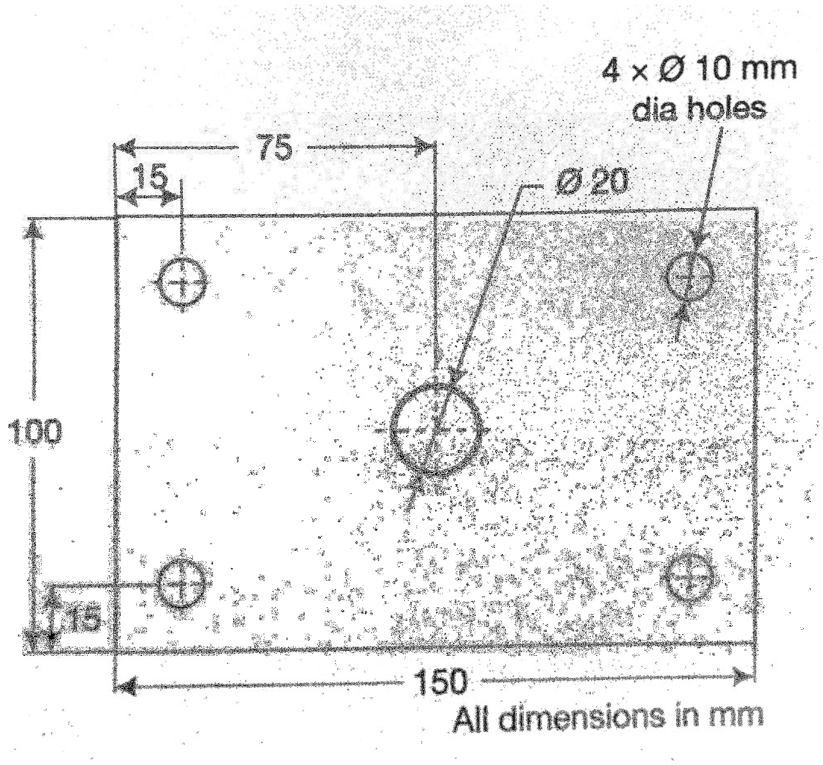
3. Explain the working principle of AWJM with a labelled sketch. Explain the function of the intensifier unit of the machine. Mention about the applications of AWJM process.

4. With a neat sketch explain the working principle of USM process. Write down the applications, advantages and limitations of the process.

5. With a labelled diagram mention important components of a USM set up. State about the abrasive slurry used in USM.

6. State about the abrasive materials used in i) AJM, ii) WJM, iii) AWJM and iv) USM. Mention different types of feed mechanism used in USM and show simple sketch sketches.

7. Write a complete part program using the ISO codes for the component shown in Fig 1 .The thickness of the component is 10 mm. Clearly show the set point and axes on the sketch of the part.



8. a)Draw the resistance-capacitance relaxation circuit used in EDM. Show the variation of instantaneous voltage across the tool-workpiece gap along with the time. Prove that $V = V_0\{1 - e^{t/RC}\}$. Notations have their usual meanings.

b) In an electrochemical machining process with a pure iron work piece, a removal rate of 5 cm^3/min is desired. Determine the current required. The gram atomic weight, valency and density of iron are 56 gm, 2, 7·8 gm/cm3 respectively.

9. a) Give a schematic diagram of a FMS and explain the functions of its various components.
b) What are different types of transfer lines explain briefly?

10. The following component (shown in Fig) is to be made using a CNC turning centre equipped with a FANUC controller. Prepare the part program to completely machine the part. Clearly show the set point and axes on the sketch of the part. Prepare the planning sheet also.

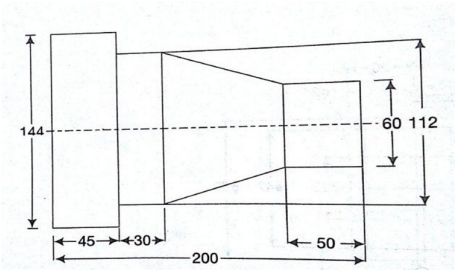


Fig.

11. Draw a schematic Diagram of Ultrasonic Machining (USM) set up and describes the working principle of USM.

12. a)Discuss the Influence of Process parameters of USM on (i) machining rate (ii) Surface finish and (iii) accuracy
b) Explain application, advantages and limitations of Wire-cut EDM:

13. Write short notes on any *three* of the following:

a) Stereo lithography (SLG)

b) fused deposition modelling (FDM)

c) Hybrid Machining

d) 3-D Inkjet Printing

e) Open loop and Closed loop control system in CNC

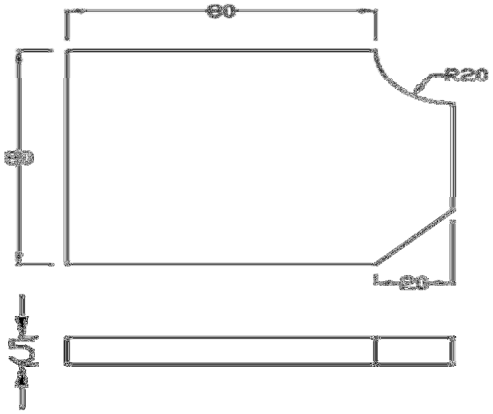
14. With neat diagram explain the working principle of ECM. State its advantages, limitations and applications.

15. Describe the basic material removal mechanism in EDM. Discuss the Influence of Process parameters of EDM on (i) machining rate (ii) Surface finish and (iii) overcut

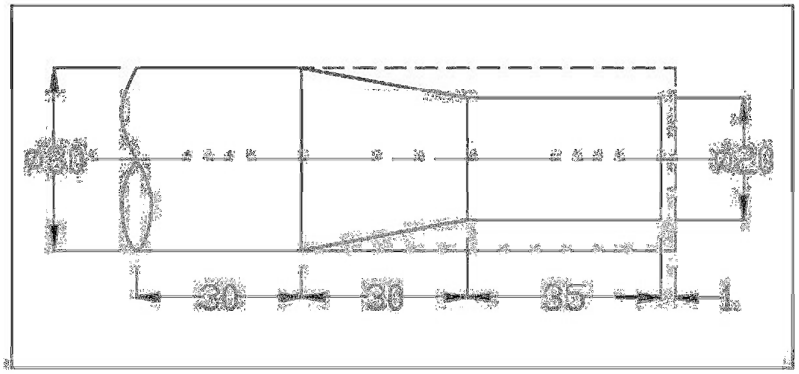
16. Identify various machining parameters and the influences on machining performance criteria in ECM. Differentiate between ECM and EDM machining.

17. Describe the basic material removal mechanism in USM. Discuss the Influence of Process parameters of USM on (i) machining rate (ii) Surface finish and (iii) accuracy

18. The following components (shown in **Fig.**) is to be made using a CNC milling equipped with a FANUC controller. Prepare the part program to completely machine the part. Clearly show the set point and axes on the sketch of the part. Prepare the planning sheet also.



19. Write a complete part programming using the ISO codes for the following component as shown in Fig .



20. a) During an electric discharge drilling of a 10 mm square hole in a low carbon s ee plate of 5 mm thickness, brass tool and kerosene re used. The resistance and the capacitance in he elaxation circuit are 50 ohm and 10 micro Farad respectively. The supply voltage is 200 volts and the gap is maintained at such a value that the dis harge takes place at 150 volts. Estimate the time requ red to complete the drilling operation.

b)Explain any two EDM circuit for supplying pulsating dc current.

21. Discuss about the co-ordinate measuring machines.
Describe the application of automated integration in CAD/CAM /CIM system.

22.a) In an electrochemical machining process with a pure iron work piece, a removal rate of 5 cm^3/min is desired. Determine the current required.
The gram atomic weight, valency and density of iron are 56 gm, 2, 7 · 8 gm/ cm^3 respectively.

b)In ECM process, why is electrolyte flow necessary ? Explain the reasons for poor surface finish in an ECM process.

23. a) Describe the fundamental principles of metal removal in Electro-chemical Machining. Briefly explain the significance of Electrolyte used in ECM and also the importance of 'Tool-work gap'.
b) Write a note on the special features of the equipments used in WJM .

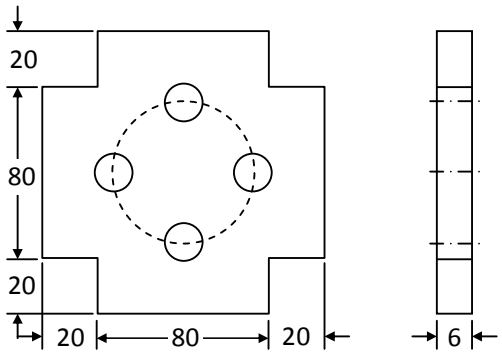
24.a) Draw schematically the layout diagram of an AWJM and briefly describe its working principle.

b) State the abrasive particles used in AWJM to keep it eco-friendly.

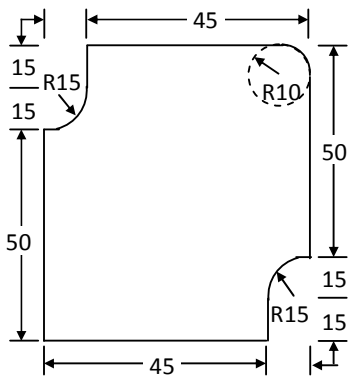
25. a) Describe the working principle of Laser Beam Machining (LBM).

b)What are the major applications of LBM ?

26. Prepare manual part program for machining the component with 4 holes of 10 mm diameter on 60 mm p.c.d. as shown in Fig.1 using ISO code. Do not use G41 or G42.



27. Prepare NC program in APT for machining the contour shown in Fig.4 with two passes one with rough-cut and other with finish cut.



28. Prepare manual part programming for turning the component shown in Fig. on CNC lathe using ISO code. Assume the tool tip radius is 2 mm.