MCQ type questions

1. Merchant's circle diagram (MCD) in machining deals with
a) cutting force components
b) mechanism of chip formation
c) cutting tool geometery
d) cutting temperature.

2. The teeth of internal spur gears are produced by machining in
a) milling machine
b) gear hobbing machine
c) gear shaping machine
d) planing machine.

3. A cutting tool can never have its
a) rake angle-positive
b) rake angle-negative
c clearance angle-positive
d) clearance angle-negative.

4. In grinding operation, which one acts as a cutting tool?
a) H.S.S. tips
b) Diamond tips
c) Carbide tips
d) Abrasive grains.

5.In 18-4-1 HSS, the ratio corresponds to
a) W : Cr : V
b) W : V : Cr
c) V : Cr : W
d) Cr : V : W.

6. Forces due to metal cutting are measured by
a) rotameter
b) tachometer
c)
dynamometer
d) micrometer.

7.Which of the following is the hardest cutting tool material next only to diamond?
a) Ceramics

b) Cubic boron nitride
c) Cemented carbide
d) Coated carbide.

8.The point angle is HSS twist drill is
a) 60° , b) 118°, c) 128°, d) 90°.

9. A grinding wheel is specified by
a) grain size, b) grit size, c) grade, d) all of these.

10.Cemented carbide tools are generally provided with
a) positive back rake angles
b) negative back rake angles
c) zero back rake angles
d) none of these.

11. The angle between orthogonal plane and normal plane of a single point turning tool (SPTT) is
a) γ_o; b) γ_n, c) ; d)λ

12. Chip reduction coefficient is
a) always less than 1·0
b) equal to or less than 1·0
c) more than 1·0
d) none of these.

13.In cutting tools, crater wear develops at:
a) the rake surface
b) the principal flank
c) the auxiliary
d) the tool nose

14.The angle between side cutting edge and end cutting edge is called as
a) approach angle
b) nose angle
c) side relief angle
d) end relief angle

15. The cutting tool removes the metal from workpiece in the form of
a) solid blocks
b) powder
c) chips
d) all of the above

16. In the metal cutting process, when the compression limit of the metal in front of the cutting tool has been exceeded then it is separated from workpiece and flows
a) elastically

b) plastically
c) rigidly
d) none of the above

17. The materials are added to cutting tools to increase their properties. Match the following

1. Tungsten a. Hardness
2. Carbon b. Hot hardness
3. Vanadium c. Wear resistance

The correct order is

a) 1-b, 2-a, 3-c
b) 1-c, 2-a, 3-b
c) 1-b, 2-c, 3-a
d) 1-a, 2-b, 3-c

18. Which of the following tools are generally manufactured by Powder metallurgy?

a) Low carbon steel
b) Abrasives
c) High carbon steel
d) Cemented carbides

19. Which of the following is hardest known material?

a) Cemented carbide
b) Ceramics
c) Cubic boron nitride (CBN)
d) Diamond

20 .The cutting tool wears due to

a) Edge wear
b) Crater wear
c) Flank wear
d) All of the above

21. The cutting speed of High speed steels is ___ times faster than Carbon steel

a) 2
b) 4
c) 6
d) 8

22. Which of the following cutting conditions greatly affects the tool wear?

a) Cutting speed
b) Feed
c) Depth of cut
d) None of the above

23. Which of the following is not a constituent of High speed steel?

a) V
b) Cr
c) W
d) Ni

24. A drill bit of 20mm diameter rotating at 500 rpm with a feed rate of 0.2 mm/revolution is used to drill a through hole in Mild Steel plate of 20mm thickness. The depth of cut in this drilling operation is
a) 100 mm
b) 20 mm
c) 10 mm
d) 0.2 mm

25. The tool life increases with the
a) Increase in side cutting edge angle
b) Decrease in side rake angle
c) Decrease in nose radius
d) Decrease in back rake angle

26. In the Taylor's tool life equation, VT^n = C, the value of n=0.5. The tool life has a life of 180 minutes at a cutting speed of 18 m/min. If the tool life is reduced to 45 minutes, then the cutting speed will be
a) 9 m/min
b) 18m/min
c) 36m/min
d) 72m/min

27. The cutting velocity in m/sec, for turning a work piece of diameter 100 mm at the spindle speed of 480 rpm is
a) 1.26
b) 2.51
c) 48
d) 151

28. Which of the following tool materials have cobalt as a constituent element?
1. Tungsten carbide 2. CBN 3. Stellite 4. UCON
Select the correct answer using the codes given below
a) 1 & 2
b) 1 & 3
c) 1 & 4
d) 2 & 3

29. The approximately variation of the tool life exponent 'n' of cemented carbide tools is
a) 0.03 to 0.08
b) 0.08 to 0.20
c) 0.20 to 0.48

d) 0.48 to 0.70

30. Using the Taylor equation VT^n=c, calculate the percentage increase in tool life when the cutting speed is reduced is reduced by 50% (n=0.5 and c=400)

a) 300%
b) 400%
c) 100%
d) 50%

31. Consider the following actions:

1. Mechanical abrasion
2. Diffusion
3. Plastic deformation
4. Oxidation

Which of the above are the causes of tool wear?

a) 2 & 3
b) 1 & 2
c) 1, 2 & 4
d) 1 & 3

32. Consider the following statements:
Chipping of a cutting tool is due to

1. Tool material being too brittle
2. Hot hardness of the tool material
3. High positive rake angle of the tool

Which of these statements are correct?

a) 1, 2 & 3
b) 1 & 3
c) 2 & 3
d) 1 & 2

33. A milling cutter of 70 mm diameter with 12 teeth is operating at a cutting speed of 22 m/min and a feed of 0.05 mm/tooth. The feed rate per minute is

a) 110 mm/min
b) 35 mm/min
c) 6 mm/min
d) 60 mm/min

34. The surface of the single point cutting tool on which the chips formed in cutting operation slide is called as

a) Flank
b) Heel
c) Face
d) Shank

35 Lead angle in the single point cutting tool is the angle between

a) the end cutting edge and the normal to the tool shank
b) the portion of side shank immediately below the side cutting edge and the line perpendicular to the base of the tool
c) the tool face and the parallel to the base of the tool
d) side cutting edge and the side of the tool shank.

36. Tool life in orthogonal cutting is

a) more than the tool life in oblique cutting
b) less than the tool life in oblique cutting
c) equal to the tool life in oblique cutting
d) cannot say

37. In metal cutting operation, maximum heat (i.e. 80-85%) is generated in

a) the shear zone
b) the chip-tool interface zone
c) the tool-work interface zone
d) none of the above

38. Which cutting condition affects the cutting temperature predominantly

a) depth of cut
b) cutting speed
c) feed
d) none of the above has any effect on cutting temperature

39. The point at which the cutting tool reaches, beyond which it will not function satisfactorily until it is reground, is called as

a) tool wear
b) tool failure
c) too diffusion
d) none of the above

40. Which type of chips form while machining of brittle materials?

a) continuous chips
b) discontinuous chips
c) Built-up chips
d) all of the above with some proportion

41 Which type of chips form while machining of ductile materials?

a) continuous chips
b) discontinuous chips
c) Built-up chips
d) all of the above with some proportion

42. Continuous chips are formed during metal cutting operation due to

a) ductile work materials

b) large rake angle
c) high cutting speed
d) all of the above

43. The forces required for metal cutting operation
a) increase with increase in the feed of the tool and decreases with increase in the depth of cut
b) decrease with increase in the feed of the tool and increases with increase in the depth of cut
c) increase with increase in both the feed of the tool and the depth of cut
d) decrease with increase in both the feed of the tool and the depth of cut

44. Which type of cutting tools have wide application on lathes?
a) single point
b) multi point
c) both single point and multi point
d) none of the mentioned

45. Which of the following is the example of multi point cutting tool?
a) milling cutter
b) broaching tool
c) both milling utter and broaching tool
d) none of the mentioned

46. Which of the following is the example of cutting shaping process?
a) knurling
b) forging
c) pressing
d) drawing

47. In which type of operation, motion of cutting tool is translating?
a) drilling and milling
b) milling and turning
c) boring and drilling
d) turning and planning

48. In which type of operation, motion of cutting tool is rotary as well as translating?
a) planning
b) milling
c) drilling
d) turning

49. . Which type of job motion is there in drilling operation?
a) rotary
b) translating
c) fixed

d) none of the mentioned

50. In determining the various forces on the chip, Merchant assumed that the
    a) cutting edge of the tool is sharp and it does not make any flank contact with the workpiece
    b) only continuous chip without built-up-edge is produced
    c) cutting velocity remains constant
    d) all of the above

Long answer type questions.

1. Define: **machining** and **machine tool**.
2. What are meant by generetrix, directrix, and primary cutting motion and feed motion? Show illustrative sketches as well.
3. State about the two methods/principles of machining: generating and forming. Give examples.
4. Define cutting speed, feed and depth of cut in machining process. Illustrate all of them considering turning operation.
5. Write a note on classification of machine tools.
6. Give the basic ideas about NC, CNC and DNC machine tools. What is a machining centre? What are its special features/advantages? Distinguish between CNC and DNC and also between NC and DNC machine tools.
7. What are the advantages of NC/CNC machine tools over conventional machine tools? Also write about the application characteristics of NC/CNC machine tools.
8. With relevant sketch/sketches describe recirculating ball and nut (recirculating ball screw). What are its advantages?
9. What is the purpose of apron mechanism in a lathe? What is the function of lead screw in a lathe where both feed rod and lead screw are provided with? What is the function of feed rod in this case? If on a lathe, only lead screw is provided with no feed rod then what is/are the function/functions of the lead screw there?
10. Classify lathes and state about the applications of each.
11. Distinguish between speed lathe and engine lathe and also between solid bed lathe and gap bed lathe.
12. State about turret lathe and capstan lathe. Write about their usefulness and also distinguish between them.
13. Name and describe various taper turning methods with illustrative sketches : taper turning by i) swivelling the compound slide, ii) tailstock set over method, iii) using broad nose tool iv) simultaneously applied longitudinal and cross feeds, vi) using taper turning attachment. State about usefulness and limitations of each of these methods as well.

14. Name and explain the factors on which selection of cutting spend depends in machining process. Or, why are different spindle speeds provided in a lathe?
15. What is meant by tool life? State the factors on which tool life depends. Write Taylor's tool life equation, identifying each term.
16. What are the essential properties of cutting tool materials and what are the other desirable properties? Explain each property.
17. State and explain the various modes of tool failure.
18. Show in sketches the following operations on lathe: straight turning, facing, grooving, parting off, drilling, boring, reaming, thread cutting, profile/contour cutting, knurling etc.
19. Show in sketches crater wear and flank wear.
20. Write a short note on tool wear.
21. Discuss about various types of wear: abrasive wear, adhesive wear, diffusion wear, fatigue wear.
22. Write short notes on the following cutting tool materials: HSS, Carbides, ceramics, diamond, stellites, CBN, coated carbides, cermets.
23. Describe different methods of coating used for making coated carbides.
24. What is meant by 18-4-1 HSS? Write its composition.
25. What are the different grades of carbides? State about their respective uses. State about throw away tips/inserts.
26. Determine the set over amount for a job, whose taper angle is required to be 6 degree, over its total length of 235 mm. Also find the set over amount to turn a taper of 1 in 100 on a job over his full length of 800 mm.
27. Find that the expression for machining time in turning: T = L/ (SN) multiplied by i, where T is time in min, L is the length to be travelled by the tool in mm, N is the rpm of the job/work piece, i is the number of passes required.
28. Find an expression for material removal rate(mrr), in turning operation (mrr = 1000vst = πDNst mm^3 /min, where D is the diameter of the work piece in mm, v is the cutting speed in m/min, s is feed in mm/rev, t is depth of cut in mm and N is the rpm of the work piece.
29. How much time will be required to reduce the diameter of a bar from 120 mm to 80 mm over a length of 100 mm by turning on a lathe ?(assume job rpm = 600, feed = 0.24 mm/rev and depth of cut = 4mm)
30. For turning a job from 80 mm diameter to 60 mm, cutting speed is recommended as 32 m/min, when the tool material is HSS and Job material is mild steel. What should be the rpm of the job to turn the job at the said cutting speed? Now consider that length of the job is 400 mm and full length of the job is to be turned to 60 mm. Estimate the machining time. Assume feed = 0.2 mm/rev and depth of cut = 2 mm.
31. For a given work-tool pair, tool life of 90 min is found with cutting speed V= 30 m/min, feed s = 0.25 mm/rev and depth of cut t = 2 mm. If the cutting speed is increased by 25%, what will be the effect on tool life? Tool life equation is $VT^{0.12}f^{0.7}t^{0.3}$ = C. What will be the effect if V, f and t – all are increased by 20% at a time?

32. During straight turning of a 24 mm diameter steel bar with an HSS tool at 300 rpm, a tool life of 9 min was observed. When the same bar was turned at 250 rpm, tool life increased to 48.5 min. What will be tool life when the job is turned at 280 rpm?
33. A high speed steel tool is used for machining a job at a cutting speed of 35 m/min and has a tool life = 55 min. Find the tool life at a cutting speed of 40 m/min. Assume n = 0.13 (Taylor's exponent)
34. Show in suitable sketches all the elements that are specified in ASA, ORS and NRS (Show sketches/views separately for each of these systems).
35. The tool signature of a turning tool is given in ASA as 8^o - 7^o - 9^o -8^o -15^o -30^o – 1/64''. Identify each of these elements and draw necessary views to show them.
36. Write about the importance of rake angle, clearance angle.
37. Define orthogonal rake, back rake, side rake, normal rake, auxiliary orthogonal rake and clearance angles, inclination angle, primary cutting edge angle, auxiliary cutting edge angle/end cutting edge angle.
38. Show in sketches positive and negative rake angles and state about the advantages and disadvantages of both.
39. Distinguish between orthogonal cutting and oblique cutting. Show illustrative sketches.
40. Name different types of chip and discuss about them. What is BUE? How is it formed? Write about its effects on the machining process.
41. What is chip reduction coefficient? What is cutting ratio? Mention about significance of them.
42. Draw a free body diagram of chip in metal cutting/machining process showing the forces acting between chip and the tool face.
43. Show a typical Merchant circle diagram showing the forces and the relevant angles. What are the assumptions in respect of Merchant circle diagram?
44. With reference to Merchant circle diagram, deduce all the relationships relevant to forces in different directions, friction force, shear force, normal force etc.
45. While turning with a tool 0^o – 0^o -10^o – 10^o – 20^o – 90^o – 0 (mm) what will be the shear angle, given feed = 0.2 mm/rev, if chip reduction coefficient = 2 (cutting ratio = 0.5)
46. In orthogonal cutting of steel, the following observations are made: vertical/main cutting force = 1500 N, horizontal cutting force = 1000N, rake angle = 10 degree, cutting ratio = 0.35 (chip reduction coefficient = 1/0.35). Find the coefficient of friction at the chip tool interface using merchant circle diagram. Derive the equations used.
47. During turning a steel shaft of 160 mm diameter at 560 rpm, employing feed = 0.12 mm/rev and depth of cut = 4mm by a tool : 0^o – -10^o -6^o – 6^o – 15^o – 75^o – 0 (mm), the following data are obtained: cutting force = 1600 N, thrust force = 828 N and chip thickness = 1mm. Compute friction force on tool face and corresponding normal force, resultant force, coefficient of friction at chip-tool interface, power and specific cutting energy.
48. Calculate the inclination angle and orthogonal rake angle for a single point turning tool having back rake angle = 8 degree, side rake angle = 10 degree and side cutting edge angle =

15 degree. Also find out the shear angle and cutting ratio for a feed = 0.2 mm/rev and chip thickness = 0.5 mm.

49. In an orthogonal cutting, the following data are available: uncut chip thickness = 0.127 mm, width of cut = 6.35 mm, cutting speed = 2 m/s, rake angle =10 degree, cutting force = 567 N, thrust force = 227 N, chip thickness = 0.228 mm. Calculate: shear angle, friction angle, shear stress, power, chip velocity, shear strain, shear strain rate. What is the importance of determining/measuring cutting forces?

50. Following observations are made during orthogonal cutting of an aluminium alloy: uncut chip thickness = 0.18 mm, width of uncut = = 4 mm, length of uncut chip = 165 mm, length of cut = 45 mm, width of chip = 4.5 mm, coefficient of friction = 0.75, cutting speed = 35 m/min, Rake angle = 20 degree. Calculate cutting force and power consumption. Assume ultimate shear stress of the work material = 245 N/mm^2

51. During turning a mild steel bar of 100 mm diameter with a carbide tool geometry: $0^o - 6^o$ $-8^o - 7^o - 15^o - 90^o - 0$ (mm) at 400 rpm and feed of 0.2 mm/rev, the following data are obtained: tangential force = 1200 N, axial force component = 600 N, chip thickness = 0.5 mm. Determine frictional force and normal force acting at the chip tool interface during the said machining.

52. State the sources of heat generation in machining. How can machining temperature be controlled ?

53. What is machinability and machinability index? State different tool wear mechanisms.

54. Explain centreless grinding with a sketch showing different elements on it.

55. What are the different types of kinematic structure in machine tools? Explain a “C” type kinematic structure with neat sketch.

56. The following equation for tool life is given for a turning operation : $VT^{0.13} f^{0.77} d^{0.37} = C$. A 60 minute tool life was obtained while cutting at $V = 30$ m/min, $f = 0.3$ mm/rev & $d = 2.5$ mm Determine the change in tool life if the cutting speed, feed & depth of cut are increased by 20% individually & also taken together.

57. What are the sources of Generatrix and Directrix. Explain Generatrix and Directrix with neat sketch for the following operations (any two):

58. What is speed gear box speed gearbox (in 3 stages).What is ‘Ray diagram’. Design feasible open type ‘speed flow diagram’ and gear layout for a 12 speed gearbox (in 3 stages)

59. Why Broaching is called progressive cutting? Explain Broaching with neat sketch. What are the major components of a Planing Machine?
60. Explain glazing and loading of a grinding wheel. How can these be avoided or reduced?
61. What are meant by grain/grit size, grade and structure of a grinding wheel and mention about their importance.
62. What is the purpose of bond material in a grinding wheel? Name various types of bond materials used in a grinding wheel and their respective uses.
63. Name different abrasive materials used in a grinding wheel and mention about usefulness / applications of each one.

64. What is meant by hard wheel and what by soft wheel? Why is softer grinding wheel preferred for grinding harder material? Explain clearly.
65. Explain centre less grinding with a neat sketch. What are the advantages of this process and what are its limitations?
66. With an example explain how is a grinding wheel specified?
67. What is meant by grind ability? What is grinding ratio?
68. Write the specification of a grinding wheel to grind a high carbon steel shaft and justify your selection of the same.
69. What are the influences of grit size, structure and grade on the results of grinding process? Write with respect to each one separately.
70. Describe cylindrical grinding process on centre type cylindrical grinding machine. Distinguish between plunge cut grinding and traverse cut grinding, show relevant sketches as well.
71. What are meant by truing and dressing of a grinding wheel? Why are these done? Show sketches of any two types of wheel dresser.
72. What is meant by machinability? How can it be judged or what factors do govern machinablity characteristics of any work material?
73. With a neat sketch describe thread cutting operation on a lathe.
74. With a neat sketch explain slotted arm quick return mechanism used in shaping machine.
75. Distinguish between shaping machine and planning machine.
76. How is a shaping machine specified? Distinguish between push cut shaper and draw cut shaper.
77. What is a travelling head shaper? State about its use. How is feed expressed in shaping operation?
78. Derive an expression of average cutting speed in shaping in terms of quick return ration, number of double strokes per minute and stroke length.
79. Show in sketches any three operations which are done on shaping machine.
80. Give the basic idea about the broaching process. How is a broaching machine specified?
81. Write a short note on different types of broach.
82. What are meant by pull type broach and push type of broach? What is the major difference in their construction/appearance? State reason for that difference.
83. Draw a neat labelled sketch of a pull type round ordinary cut broach.
84. Draw a neat sketch of a progressive cut broach and mention about its use.
85. A centre lathe has 6 spindle speeds ranging from 40 rpm to 320 rpm. Find all the speeds, considering G.P. lay out of the speeds.
86. Name three different broaching operations and draw relevant sketches.
87. What are the advantages of broaching process? What are its limitations?
88. What are meant by up milling and down milling? Show relevant sketches.
89. Distinguish between up milling and down milling.
90. Describe with sketches any three operations commonly done on milling machine.

91. With sketches describe gang milling and straddle milling operations.
92. What is meant by indexing? Name some indexing devices used in milling machine.
93. With a neat sketch describe the working principle of universal dividing head .
94. Explain simple indexing with an example.
95. Explain compound indexing.
96. Explain differential indexing with a suitable sketch.
97. Draw a neat sketch of a tapered shank twist drill and label all the important features on the sketch.
98. Show a labelled sketch of a plain milling cutter identifying all the important features.
99. How is a upright/pillar drilling machine specified? What is a radial drilling machine?
100. Show in sketches any three operations which are commonly done on a drilling machine.
101. What is a sensitive drilling machine? State about its use/application.
102. What is meant by automation? What are meant by hard/fixed automation and soft automation?
103. What is a fixture? What is a jig? State about the difference between them.
104. What is ray diagram? State about its usefulness. Draw ray diagrams for i) a 6 speed and ii) a 9 speed gear box.
105. Write a short note on FMS.
106. Distinguish between batch production and mass production.
107. Discuss about any two of the following cutting tool materials: HSS. Cemented/sintered carbides, ceramics, coated carbides, satellites, cermets, diamond, CBN.
108. What are the different grades of carbides? Discuss about them. (or, what are meant by single carbide, double carbide and triple carbide? Write composition of each and their respective uses.)
109. Name and state about different methods of coating used to produce coated carbide tools.
110. Explain gear cutting on milling machine.
111. Calculate change gears for cutting 2mm pitch thread on a lathe have 6 mm lead screw pitch. Also calculate change gears to cut a thread of 0.25 mm pitch on a lathe with pitch of lead screw = 8mm. Show arrangement/location of gears in each case (or, show the sketch of the set up)
112. How is a left hand thread cut on lathe? What is a centre gauge and how is it used in the context of thread cutting/ Explain with a sketch.
113. Show the calculations for indexing 40 and 35 divisions on a Brown & Sharpe universal dividing head.
114. Show necessary calculations for indexing 67 divisions on Brown & Sharpe universal head. Use compound indexing. Describe the method also.
115. Show the necessary calculations for differential indexing of 73 divisions on Brown & Sharpe universal head. Explain the results of your calculation to carry out the indexing. Available gears are: (24 – 2 nos. , 28, 32, 40, 44, 48, 56, 64, 72, 86, 100).

116. A grinding wheel‘s main specification is given as A 60 K 9 V. State about all the information carried by this specification.
117. Why are speeds generally laid out in G.P, in machine tool drive? Explain clearly.
118. What is Geneva mechanism? Explain it. Give an example of its use in machine tools.
119. What is the effect of feed on surface finish? What are the effects of nose radius on machining performance?
120. How are tapered shank and straight shank drills mounted in the spindle of a drilling machine?
121. State about the proportions of heat carried by chip, cutting tool and work piece.

Long answer type questions.

1. Draw a schematic diagram to illustrate the kinematic structure of gear hobbing machine.
2. Explain the working principle of gear hobbing process and gear shaping process with a neat sketch.
3. State about various methods of gear tooth cutting and explain the basic principle of each of them.
4. i) Find the machining time for removing 8 mm thickness from the top of a mild steel plate 600 mm x 400 mm. The quick return ratio is 3/2, cutting speed = 30 m/min, feed = 0.2 mm/stroke. Assume other data reasonably, if needed. Maximum stroke length of the machine is 910 mm.
   ii) Calculate material removal rate for a drilling operation on a solid work piece diameter of the hole = 30 mm, feed = 0. 24 mm/rev and drill rpm is 300. Also calculate machining time. Assume reasonable data, if needed.
5. Write short notes on :i) three and four jaw chucks ii) steady rest and ii) follow rest
6. Name various job holding devices used on lathe and discuss about any there of them with necessary sketches.
7. Discuss about flank wear, crater wear with illustrative sketches. Also explain wear due to i) abrasion ii) adhesion and ii) diffusion
8. Discuss about different wear mechanisms. What is the predominant mechanism of wear, while steel is being machined with carbide tools?
9. State the purposes of cutting fluid. Name some cutting fluids and their respective uses. State about the different methods of application of cutting fluids.
10. Draw a labelled sketch to show kinematic structure/constructional features of any one of the following machine tools : i) Centre lathe ii) pillar drilling machine iii) horizontal knee type drilling machine iv) vertical knee type milling machine v) shaping machine
11. Describe any three taper turning methods with illustrative sketches.

12. Draw a pictorial view of a typical single point turning tool and label all the important features on it. Write the tool signatures in ASA, ORS and NRS. Name each of the elements in each of these systems.
13. Draw a schematic view of a shaping machine showing all the important constructional features with proper labelling.
14. i) With a neat sketch explain taper turning method by using taper turning attachment ii) Distinguish between fixture and jig iii) what is meant by throw away tips/inserts. State about their utility.
15. i) State about machinability index. ii) Discuss about the essential properties of cutting fluid iii) A grinding wheel is specified by 54 A 60 K 5 V 1988/6. Identify each elements given in this specification
16. Write short notes on i) HSS ii) carbides and iii) ceramics tool materials
17. Write short notes on i)coated carbides ii) diamond and iii) CBN and iv) satellites as cutting tool materials
18. i) What is a piece production/job order production? How does it differ from batch production? Ii) state about wear of grinding wheel iii)
19. Classify lathes and state about their applications.
20. Explain bar feeding mechanism used in semi-automatic/automatic lathe/ capstan and turret lathes, with a neat sketch ii) State about feedback control and sequential control iii) state about tool indexing in turret/capstan lathe.
21. With the help of a sketch/diagram explain how cutter speed (rpm) is changed , when required, in a conventional milling machine.
22. Start about the special characteristics of the grinding process with respect to other machining processed like turning, drilling, milling shaping et.
23. Write a short note on any one of the following processes i) lapping ii) honing ii)buffing iv)polishing v) super finishing
24. Name and show in sketch any six lathe operations (Give illustrative sketches to show straight turning, parting off, grooving, facing, thread cutting and drilling operations on lathe
25. Discuss about different types of manufacturing processes.
26. { Combination of any three questions from GROUP B (short answer type questions), thus many more number of questions, which need not be repeated here}
27. In an orthogonal cutting, the following data are available: rake angle =20 degree, depth of cut = 6mm, feed = 0.25 mm/rev, chip length before cutting = 29.4 mm, chip length after cutting = 12.9 mm, vertical cutting force = 1050 N, horizontal cutting force = 620 N. On the basis of Merchant circle analysis, find direction and magnitude of resultant force; shear plane angle, friction force and friction angle.
28. During the machining of C-20 steel with a 0-10-6-6-8-75-1 mm (ORS) shaped triple carbide cutting tool, the following observations have been made: Depth of cut =2 mm;

feed =0.2 mm/rev; chip thickness =0.39 mm; P_z =160 N ; P_x=85 N ; Using Merchant' circle analysis calculate the followings

a) The frictional force and normal force;
b) Mean frictional angle and kinematic co-effiient of friction.
c) Cutting ratio, shear plane angle
d) The shear force and normal force at shear plane
e) Direction and magnitude of resultant force.

t shear plane