S'12:6 FN:MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Justify the materials you would select for manufacturing of (*i*) sledge hammer, and (*ii*) machine tool column. 3 + 3

(*b*) In how many ways can you manufacture gears found in a machine tool ? State *any one* unique characteristic of each of those processes. 6

(*c*) State compositions and applications of stainless steels. 4

(*d*) State the merits of a casting process. 4

(Turn Over)

2. (*a*) Differentiate between pressurized and unpressurized gating systems. 5

(*b*) What is the principle of centrifugal casting process? What types of materials are most suitable and why? 5

(*c*) What is the difference between a 'pattern' and a 'master pattern'? 5

(*d*) Explain Chvorinov's principle of riser design. What are its limitations? 5

3. (*a*) Explain the process of extrusion with the help of a sketch. 5

(*b*) Can you use a blanking punch for a piercing operation? Explain your answer. 5

(*c*) Briefly explain the explosive forming process. 5

(*d*) In which respects hot rolling would differ from cold rolling? 5

4. (*a*) How is annealing different from normalising? 5

(*b*) What products are made in injection and blow moulding processes? Name *any one* unique feature of these two processes. 5

(*c*) What is stereolithography? 5

(*d*) Name the advantages and disadvantages of powder metallurgy processing. 5

Group B

5. (*a*) How does the performance of an HSS tool differ from that of a ceramic tool? 5

(*b*) How are grinding wheels specified? 5

(*c*) What are the functions of cutting fluids in a machining operation? 4

(*d*) Explain the ASA nomenclature of a single point cutting tool. 6

6. (*a*) What is a secondary drive in a machine tool? Why are secondary drives needed? 5

(*b*) Are guideways and slideways same? Explain your answer. 5

(*c*) What are open loop and close loop controls in NC machines? 5

(*d*) State main features of DNC machining. 5

7. (*a*) Explain the characteristics of the abrasives used in AJM and USM. 5

(*b*) Explain the principle of material removal in ECM process. 5

(*c*) State the merits of the EBM and LBM processes. 5

(*d*) State the process capabilities and applications of EDM process. 5

8. (*a*) Differentiate between welding, brazing and soldering. 5

(*b*) What is heat-affected zone in a welded joint? Explain with reference to medium carbon steel. 5

(*c*) What is the difference between the tools used in spot resistance and seam resistance welding? 5

(*d*) Which process would be selected for welding aluminum welding? Why? 5

Group C

9. Briefly answer the following : 10 × 2

(*i*) Define manufacturing cycle with the help of an example.

(*ii*) What is the main cause of blow hole in a casting? How can a blow hole be identified?

(*iii*) Define rapid prototyping technique.

(*iv*) Name different methods of production of metal powders.

(*v*) What is deep drawing? Explain with a sketch.

(*vi*) How would you cut square threads in a lathe machine?

(*vii*) What are the functions of shielding gases used in the MIG welding?

(*viii*) Why is edge preparation needed in welding ?

(*ix*) State the principle of material removal in the ECG process.

(*x*) What is the difference between grinding and finishing?

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MANUFACTURING TECHNOLOGY

Time : *Three hours*

Maximum Marks : *100*

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

All parts of a question (a, b, etc.) should be answered at one place.

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Figures on the right-hand side margin indicate full marks

Group A

1. (*a*) Name engineering materials and discuss their selection criteria. 6

(*b*) Explain following patterns : Loose piece pattern, gated pattern, and sweep pattern. 3 × 2

(*c*) What is continuous casting ? Describe the process with the help of a neat diagram. 8

2. (*a*) Differentiate between true centrifugal casting and semi-centrifugal casting. Give applications of both the processes. 7

(*b*) Explain two, three and four high mills with neat diagrams. 6

(*c*) Enlist the advantages and limitations of hot working. 7

3. (*a*) Define the following heat treatment processes : Annealing, normalising, hardening, tempering, nitriding, and cyaniding. 6 × 1

(*b*) Describe the processes of metal powder production. 7

(*c*) Explain injection moulding process of plastics with the help of a neat diagram. 7

4. (*a*) Discuss electro-hydraulic forming process with a neat diagram. 8

(*b*) Explain the salient features of riser design. 5

(*c*) Illustrate and explain the difference between wire and tube drawing processes. 7

Group B

5. (*a*) Sketch a milling cutter and show its various elements and angles. 4

(*b*) Describe tool nomenclature in ASA and ORS with suitable examples. 4

(*c*) Differentiate between honing and buffing. 5

(*d*) Name various tool materials and discuss the advantages of carbide over high speed steel and carbon steel. 7

6. (*a*) Explain various methods of screw thread production with their relative merits and demerits. 8

(*b*) Name different types of chips and discuss the conditions under which they are formed. 5

(*c*) Define guideway and slideway. Enlist the main requirements to be fulfilled in the design of slideway bearings. 7

7. (*a*) Describe the working principle of AJM with the help of a neat diagram. 5

(*b*) In what respect the electro-chemical grinding differs from ordinary grinding process ? 5

(*c*) Differentiate between brazing and soldering. 5

(*d*) Enlist the advantages of submerged arc welding. 5

8. (*a*) Name destructive and non-destructive testing methods of welded joints and explain one destructive and one non-destructive testing method. 7

(*b*) Discuss process selection parameters for welded joints. 5

(*c*) Explain the mechanism of metal transfer in MIG/MAG welding. 4

(*d*) Compare the relative merits and demerits of welding over adhesive bonding. 4

Group C

9. Briefly answer the following : 10 × 2

(*i*) What is DNC machining ?

(*ii*) What are different types of stainless steels ?

(*iii*) Enlist the advantages of blind riser.

(*iv*) Differentiate between a mould and a die.

(*v*) Define indexing.

(*vi*) What is the role of sintering in powder metallurgy ?

(*vii*) Differentiate between direct and indirect extrusion.

(*viii*) Give six applications of powder metallurgy.

(*ix*) Sketch two gating systems.

(*x*) Define rapid prototyping.

S'13 : 6 FN : MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

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Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Based on what considerations would you select a manufacturing process for any given product ? Give examples. 6

(*b*) What is a micro-alloyed steel ? What are its merits ? 6

(*c*) In which respects normalising heat treatment process is different from annealing ? 8

2. (*a*) Explain the principles of riser design in respect of its shape, size and placement. 6

(*b*) How is the shrinkage allowance on a pattern determined ? Explain with examples. 6

(*c*) What is an investment casting process ? Why is it so named ? 8

3. (*a*) Explain the principles of die design for blanking and piercing operations. 6

(*b*) How are rails manufactured ? Describe the process. 6

(*c*) What is the mechanism of metal flow in an extrusion process ? What are the types of products suitable for extrusion process ? 8

4. (*a*) What are the steps involved in the powder metallurgy process ? Discuss the importance of each step. 6

(*b*) Bring out the inherent differences between injection moulding and blow moulding. Name some of the products made by these two processes. 6

(*c*) What is the purpose of using a rapid prototype technology ? Enumerate the process where a laser beam can be used in producing a prototype. 8

Group B

5. (*a*) Discuss the capabilities of different tool materials used in metal cutting. 6

(*b*) With the help of sketches, show the geometry of a single point cutting tool and explain the significance of each parameter. 6

(*c*) How are screw threads manufactured by machining processes ? Explain the salient features of those processes. 8

6. (*a*) Explain, with examples, the method of specifying a grinding wheel. 6

(*b*) Discuss the functions of primary and secondary drives in machine tools. 6

(*c*) What are main features of NC, CNC and DNC machine tools used for machining ? 8

7. (*a*) What is abrasive jet machining ? How do the characteristics of the abrasives affect the machining performance ? 6

(*b*) Compare EBM with LBM in respect of their machining capabilities. 6

(*c*) Explain the mechanism of material removal in the EDM process. How do the EDM process parameters affect the material removal rate ? 8

8. (*a*) Between MIG and SAW processes, which one can have higher deposition rate ? Why ? 6

(*b*) How is brazing different from soldering ? Explain the principle of liquid filler metal flow into the joint. 6

(*c*) What is friction welding ? How are rotation and pressure related in this process ? 8

Group C

9. Answer briefly the following : 10×2

(*i*) What is meant by a manufacturing cycle ?

(*ii*) What are the causes for blow hole formation in castings ?

(*iii*) Why are aluminium alloys not suitable for centrifugal casting process ?

(*iv*) What are merits and demerits of high velocity forming processes ?

(*v*) Why is tempering heat treatment done after quenching heat treatment ?

(*vi*) What are the desirable characteristics of a cutting fluid?

(*vii*) What is buffing operation?

(*viii*) Why is grey cast iron easier to machine than mild steel?

(*ix*) What is heat-affected zone in welding and what is its significance?

(*x*) What are the functions of a flux used in welding?

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MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

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Group A

1. (*a*) What is the role of a manufacturing cycle in effective utilization of recourses ? Discuss. 5

(*b*) Write all the processes used to manufacture a steel glass used is your house. 10

(*c*) Write composition of various types of steel used. Give examples. 5

2. (*a*) What are important aspects of gating design for casting ? How is the size of a gate decided ? Write the relation between gate and a sprue for the casting. 3 + 3 + 3

(*b*) Describe various defects caused by pattern and mould box equipment in casting. 5

(*c*) Draw a complete process of shell moulding. Write advantages and limitations of this process. 4 + 2

3. (*a*) Explain, with suitable neat sketches, the rolling and forging operations. 3 + 3

(*b*) Explain the following terms : Embossing, stamping and punching operations. 3 × 2

(*c*) What are various types of chips ? Under what condition each chip is formed ? 8

4. (*a*) Write various steps of thermo-forming and compression moulding processes. Also, give their limitations. 6 + 2

(*b*) What is the role of rapid prototype in manufacturing ? How it affects the cost and quality of product manufactured ? 3 + 3

(*c*) Briefly explain the compaction and sintering processes. Write their advantages and limitations. 4 + 2

Group B

5. (*a*) Write various gear manufacturing methods. Explain one of them with neat sketches. 4 + 3

(*b*) If the point angle of a twist drill is unsymmetrical with the axis, then what type of a hole profile can be generated ? Draw the picture of imaginated profile. 7

(*c*) Write various abrasives used for various finishing operations. 6

6. (*a*) Enumerate some of the advantages of CNC system over conventional NC machines. 6

(*b*) Discuss the special control features of a CNC system. Also, give a general configuration of the system. 4 + 3

(*c*) Explain various primary and secondary drives. What are the specific conditions of their usage ? 3 + 4

7. (*a*) Name various new machining methods. Explain process capabilities and limitations of AJM, EDM, EBM and LBM. 3 + 5

(*b*) Explain the USM process with a neat sketch. Write limitations of this process. 4 + 2

(*c*) Write various properties required of the ECM electrolyte. Name some of the electrolytes used with their advantages. 4 + 2

8. (*a*) Explain the following : 3 × 2

(*i*) Role of welding processes in the present age

(*ii*) Use of coated rod in the a.c. welding

(*iii*) Appearance and properties of neutral, reducing and oxidizing flame.

(*b*) Discuss the causes and cures for (*i*) porosity, (*ii*) penetration, (*iii*) wrap-age, (*iv*) distortion, (*v*) poor fusion, (*vi*) cracking, and (*vii*) undercutting. 7 × 2

Group C

9. Answer the following in brief : 10 × 2

(*i*) Criterion for selecting an effective manufacturing process

(*ii*) Pattern allowances and their importance

(*iii*) Plastic deformation and its importance

(*iv*) Tool signature

(*v*) Use of adhesive bonding

(*vi*) Specification of a grinding wheel

(*vii*) Usage of sintering process

(*viii*) Role of cutting fluid

(*ix*) Gear train and its application

(*x*) What is mechanical fastening process ?

S'14 : 6 FN : MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

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Group A

1. (*a*) Explain the factors determining the selection of engineering materials. 5

(*b*) Differentiate between hot chamber die casting and cold chamber die casting. 5

(*c*) Explain reciprocating mould process of continuous casting with the help of a neat sketch. 10

2. (*a*) Explain directional solidification with the help of a neat diagram. 5

(*b*) Discuss the main characteristics of hot working as compared to cold working processes. 5

(*c*) Describe electro-hydraulic forming process with the help of a neat diagram. Also, give its applications. 10

3. (*a*) Define pattern allowance and explain its various types. 5

(*b*) Discuss different methods of metal powder manufacture. 10

(*c*) Compare carburising and cyaniding processes of case hardening. 5

4. (*a*) Explain extrusion moulding process of plastics. How does it differ from injection moulding ? 6

(*b*) Differentiate between direct and indirect extrusion processes with neat diagrams. 8

(*c*) Describe different steps of investment casting and enlist its applications. 6

Group B

5. (*a*) Compare the merits and demerits of CNC and DNC machining. 7

(*b*) Describe cutting tool properties. 8

(*c*) Sketch a single point cutting tool and show its various elements and angles. 5

6. (*a*) Discuss process parameters of WJM along with the principle of the process. 7

(*b*) Explain LBM process with the help of a neat diagram. 7

(*c*) Compare welding, brazing and soldering processes. 6

7. (*a*) Describe ultrasonic welding with a neat sketch and enlist its applications. 10

(*b*) Differentiate between guideway and slideway of a machine tool with neat sketches. 5

(*c*) Enlist various methods of screw thread manufacture and explain *any one* of them. 5

8. (*a*) Explain the functions of cutting fluids. 7

(*b*) Describe different types of structures found in machine tools. 7

(*c*) Differentiate between honing and buffing. How do you specify a grinding wheel ? 6

Group C

9. Answer the following in brief : 10 × 2

(*i*) Differentiate between a gate and a riser.

(*ii*) Enlist applications of powder metallurgy.

(*iii*) Define compaction and sintering.

(*iv*) Name various types of welded joints and explain *any two* of them.

(*v*) What is heat affected zone ?

(*vi*) Differentiate between primary and secondary drives.

(*vii*) What is basic principle of compression moulding ?

(*viii*) Sketch a three high and a four high mill.

(*ix*) Name and explain different types of welding flames.

(*x*) What is rapid prototyping ?

W'14 : 6 FN : MC 406 / PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

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Group A

1. (*a*) Define pattern and their materials. Explain the role of pattern allowances in casting process. 8

   (*b*) Sketch the representation of a manufacturing system indicating the dependent and independent variables. 6

   (*c*) Classify the commonly used engineering materials. Put the following materials under the appropriate head : 6
   Grey cast iron
   Brass
   Duralumin
   Stainless steel
   Nylon

2. (*a*) Discuss the causes and remedies of following casting defects : 4 × 2

   (*i*) Blow hole

   (*ii*) Hot tear

   (*iii*) Mis-run

   (*iv*) Pin hole porosity

   (*b*) Discuss the desirable properties of moulding sand for sound casting. 3

   (*c*) Write typical products which can be produced by using any of the following process and a specific process : 3 × 3

   (*i*) Die casting

   (*ii*) Centrifugal casting

   (*iii*) Shell moulding

3. (*a*) What do you mean by recrystallisation temperature of metals ? Explain its effects on cold working and hot working of metals. 7

   (*b*) Show, by schematic sketches, the process of forward and backward extrusion. Give two examples of components produced by extrusion. 7

   (*c*) Sketch a deep drawing set-up, label various important parts of the set-up. 6

4. (*a*) Explain the process of blow moulding with neat sketches. Give *two* examples of products produced by this process. 6

   (*b*) What is thermo-forming and compression moulding ? Write condition of using the process. Give live example of products produced by this process. 6

   (*c*) Define the role of rapid prototyping. How it helps in designing and producing good quality products ? 8

Group B

5. (*a*) Sketch a single point cutting tool indicating all its cutting faces and angles. Write values of all angles for best cutting process. 8

   (*b*) Differentiate between ASA, ORS and NRS systems indicating their role in the best cutting. 6

   (*c*) Discuss various operating parameters of a grinding process. How these parameters contribute in achieving the best surface. 6

6. (*a*) Explain the principle of EDM with a neat sketch. Write the characteristics required for a good electrode material used. Also, indicate important parameters which control the MRR in EDM. 8

   (*b*) Describe four main features of CNC machines. How are they different with conventional machine tools ? 5

   (*c*) Define material removal process by USM. 7

7. (*a*) Explain different types of chips produced during machining. Describe, with a neat sketch, the formation of BUE (build up edge). 7

   (*b*) Write the role and characteristics of cutting fluids used in machining process. 5

   (*c*) Sketch a gear hob and label its elements. 8

8. (*a*) Explain the TIG and MIG systems of arc welding. Give one example for each type of arc welding. 6

(*b*) What is the role of flux ? How it helps in the welding process ? 6

(*c*) Discuss the basic design considerations in the selection of welding process. 8

Group C

9. Answer the following in brief : 10 × 2

(*i*) Write various techniques used for inspection of good casting.

(*ii*) Differentiate between drawing and extrusion process.

(*iii*) Explain the stereolithography technique.

(*iv*) Discuss important methods of metal powder manufacture.

(*v*) Discuss the compaction and sintering processes.

(*vi*) Sketch a grinding wheel and label it.

(*vii*) Differentiate between CNC and DNC machining.

(*viii*)Define brazing and soldering processes.

(*ix*) Discuss heat affected zone in welding process.

(*x*) Discuss the gating and runner in the moulding process.

S'15 : 6 FN : MC 406 / PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : *Three hours*

Maximum Marks : *100*

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

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Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Name the manufacturing processes and discuss the factors which determine their selection. 7

(*b*) Describe basic design considerations in casting. 7

(*c*) Explain investment casting and enlist its advantages over die casting. 6

2. (*a*) Discuss the salient features of riser design. 7

(*b*) Illustrate and explain various types of rolling mills. 7

(*c*) Differentiate between stretch draw forming and stretch forming. 6

3. (*a*) Illustrate tube and wire drawing processes. 6

(*b*) Explain explosive forming process with the help of a neat diagram. 7

(*c*) Name various heat treatment processes and explain any *one* of them in detail. 7

4. (*a*) Differentiate between rational moulding and blow moulding processes. 7

(*b*) Describe compaction and sintering processes. 5

(*c*) Explain injection moulding with a neat sketch. 8

Group B

5. (*a*) Describe various methods of production of gears. 8

(*b*) Explain ASA, ORS and NRS with reference to tool nomenclature. 7

(*c*) Discuss the factors responsible for grinding wheel selection. 5

6. (*a*) Differentiate between ECM and ECG processes. 7

(*b*) Explain process capabilities and limitations of AJM process. 5

(*c*) Describe DNC process with the help of a neat diagram. 8

7. (*a*) Explain electroslag welding process with its applications. 8

(*b*) Name solid state welding processes and explain any *one* of them with a neat sketch. 8

(*c*) Describe tensile testing of welded joints. 4

8. (*a*) Give a comparative evaluation of advantages and limitations of adhesive bonding and mechanical fastening processes. 8

(*b*) Explain the working principle of EDM with the help of a neat diagram. 8

(*c*) Sketch a milling cutter and show its various elements and angles. 4

Group C

9. Answer the following in brief: 10 × 2

(*i*) What is manufacturing cycle ?

(*ii*) Enlist *four* applications of continuous casting.

(*iii*) Explain stereolithography technique.

(*iv*) What are the properties of metal powders ?

(*v*) How do you specify a grinding wheel ?

(*vi*) Name different tool materials.

(*vii*) Differentiate between soft and hard solder.

(*viii*) Differentiate between primary and secondary driver.

(*ix*) Enlist the limitations of EBM process.

(*x*) What are the functions of guideways ?

W'15: 6 FN: MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

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Group A

1. (*a*) Make a classification of commonly used engineering materials. 7

   (*b*) Describe the design consideration for rapid prototyping. 7

   (*c*) Describe the method of hot isostatic pressing. 6

2. (*a*) Explain, with suitable diagrams, the operations normally employed in forging. 6

   (*b*) With reference to press tools, explain (*i*) sectional die construction and (*ii*) fool-proofing of die blocks. 2 × 3

   (*c*) For hot working, it is often necessary to heat the workpiece in a furnace and there are scales losses

and other problems. Why is hot working sometimes preferred to cold working inspite of such disadvantages ? 8

3. (*a*) During the product design for casting, mention the steps used to eliminate shrinkage defects and distortions. 7

(*b*) Design the ingate dimensions for pouring a 15 kg casting in 10 sec, with the runner having a cross-section area of 625 mm^2 and two ingates of 25 mm width each. Assume equal flow through gates and density of metal to be 6.9 g/cm^3. 7

(*c*) Briefly describe carbon dioxide moulding. 6

4. (*a*) What is injection molding ? With a suitable diagram, describe reciprocating screw injection molding. 7

(*b*) Describe the method for making polystyrene sheet used to make egg cartons. 7

(*c*) With a suitable diagram, describe the method for making plastic bottles. 6

Group B

5. (*a*) What do you understand by the term 'orthogonal cutting' ? With a suitable diagram, explain the cutting tool angles of a single point cutting tool in orthogonal plane (i.e, OR system). 2 + 5

(*b*) Mention various types of bonds used in the making of grinding wheels. Also, mention their applications. 7

(*c*) Write the function of cutting fluids. Make a brief note on type of cutting fluid used in metal cutting. 6

6. (*a*) What is guideways in machine tools ? What are the requisites for a good guideways ? Draw different types of guideways profiles commonly used in machine tools and make a brief comment about each of them. 7

(*b*) Show schematically different forms of numerical control, viz., open loop and closed loop control system. 7

(*c*) Make a brief note on BTR (Behind-Tape-Reader) DNC. 6

7. (*a*) What are the basic joint design differences between designs used with filler material and those without filler materials ? 7

(*b*) What is distortion ? Name and explain four ways to control distortion in base metal in welding ? 3 + 4

(*c*) What are the *four* most common braze weld designs ? 6

8. (*a*) With a suitable diagram, describe the mechanism of material removal in electrodischarge machining process. 7

(*b*) With a suitable diagram, explain the working principle of EBM. 7

(*c*) Briefly explain the function of abrasive slurry in USM. Explain how the abrasive slurry selection is made. 6

Group C

9. Answer the following in brief : 10 × 2

(*i*) Why are whirl gates sometimes used in casting ?

(*ii*) What is fullering ?

(*iii*) What is calendaring ?

(*iv*) What is annealing ?

(*v*) Define the term 'machinability'.

(*vi*) Aerostatic guideways

(*vii*) Describe the term 'canned cycles' with respect to CNC.

(*viii*) What is buttering technique in welding ?

(*ix*) What is passivation in ECM process ?

(*x*) What is 'G ratio' in grinding ?

S'16: 6 FN: MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

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Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Why is casting preferred over other manufacturing processes ? What is a pattern ? List the factors on which the types of patterns depend. 3 + 2 + 3

(*b*) What is a core box ? Explain with a neat sketch. 2 + 2

(*c*) Explain briefly the following defects in casting : (*i*) Blowholes, (*ii*) misrun, (*iii*) cold shut and (*iv*) mismatch. 4

(*d*) Name the main types of furnaces used in foundries for melting various varieties of ferrous and non-ferrous metals and alloys. 4

2. (*a*) What are prominent materials used in various engineering applications ? How are they selected for a particular application ? 3 + 2

(Turn Over)

(*b*) What do you understand by the term 'steel' ? Explain the effect of each of the alloying element present in an alloy steel. 2 + 3

(*c*) What are the methods used for hardening of low carbon steels ? Explain with reasons. State the purposes served by quenching and tempering. 3 + 3 + 4

3. (*a*) What are thermoplastic materials ? How do they differ from thermosetting materials ? 2 + 3

(*b*) Explain 'blow moulding' and 'thermo forming' methods of processing of plastics. 2 + 3

(*c*) What are the types of rapid prototyping ? Explain stereolithography technique in detail. 2 + 3

(*d*) Explain the procedure of manufacturing parts by powder metallurgy. 5

4. (*a*) What is strain hardening ? Differentiate between hot and cold working in metal forming. 2 + 6

(*b*) How do you provide shear in blanking and piercing operations in sheet metal working ? 4

(*c*) Discuss the types of extrusion. Mention the applications of each type. Derive an expression for extrusion force under ideal conditions of deformation. 2 + 2 + 4

Group B

5. (*a*) What are the functions served by a cutting fluid in metal cutting operation ? 6

(*b*) Differentiate between single and multipoint cutting operations. 4

(*c*) How do you select a grinding wheel for a particular operation ? 4

(*d*) What is the need for development of unconventional methods of machining ? 6

6. (*a*) What are the desirable characteristics of a cutting tool material ? Specify the tool signature as per ASA system of tool nomenclature. 4 + 4

(*b*) Discuss the methods of producing gears. Mention the relative merits and demerits of each method. 4 + 4

(*c*) Describe honing method of finishing operation. 4

7. (*a*) Classify fusion welding processes. 6

(*b*) How are the welded joints tested ? 4

(*c*) Differentiate between brazing and braze welding. 5

(*d*) What are the applications of adhesive bonding ? 5

8. (*a*) Differentiate between NC and CNC machine tools. What do you understand by 'canned cycle' in manual part programming ? 4 + 4

(*b*) Explain, with a neat sketch, the principle and working of electrochemical machining (ECM) process. 6

(*c*) Discuss the types of solid state welding processes and their applications. 6

Group C

9. Briefly answer the following : 10 × 2

(*i*) What is recrystallization ?

(*ii*) What is the purpose served by risers in sand casting ?

(*iii*) What is permeability ?

(*iv*) What are the defects in rolled products ?

(*v*) What is sintering ?

(*vi*) What do you understand by 'draft' on forgings and why is it provided ?

(*vii*) What is hot machining ?

(*viii*) What is burnishing ?

(*ix*) Name the fluxes used for welding of (*a*) copper and its alloys and (*b*) cast iron.

(*x*) Indicate the sources of energy in the following processes: (*a*) EDM, (*b*) USM, (*c*) LBM, and (*d*) ECM.

W'16 : 6 FN : MC 406/PR 406 (1499)

MANUFACTURING TECHNOLOGY

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** and ALL *from* **Group C.**

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answer may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Describe the desirable properties of moulding sand. What are the effects of grain size ? 5 + 3

(*b*) What are the advantages and limitations of permanent mould over green sand mould ? 4 + 2

(*c*) What are the factors that govern the selection of a proper material for pattern making ? Discuss the merits and demerits of each material used for pattern making. 4 + 2

2. (*a*) What is the importance of a gating system ? Name different gating system generally used in sand casting. Explain any two of them with neat sketches. 2 + 2 + 4

(*b*) What is a core ? What are its function ? Explain with neat sketch the balanced core and Ram-up-core. 2 + 4

(Turn Over)

(*c*) What is the function of a riser in a casting ? Explain the relationship of riser with directional solidification. 3 + 3

3. (*a*) Explain stress, strain and Young's modulus on atomic level. Discuss various moduli related to different material. 4 + 4

(*b*) In elastic deformation is mainly caused by slip. Why so ? Justify. 4 + 2

(*c*) What necessitates recovery and recrystallisation process ? How do Hey influence the properties of materials ? 3 + 3

4. (*a*) Why are the products usually annealed before and after forging ? 4

(*b*) What is 'spring back' in bending operation ? Explain the factors responsible for this. 4 + 2

(*c*) Explain different methods of making metal/alloy powder to be used in powder metallurgy process. 5

(*d*) How are seamless steel tubes produced in large quantities ? 5

Group B

5. (*a*) What are the different methods of applying cutting fluids in metal cutting operation ? Write a brief note about suitability of water as the cutting fluid. 3 + 2

(*b*) Explain with neat sketch the differential indexing mechanism for milling machine. How to index 141 divisions. 3 + 2

(*c*) How is the tool failure ensured ? In how many ways a cutting tool is liable to fail ? 3 + 2

(*d*) What are 'Indexable Inserts' and 'Through away inserts' ? Discuss the two methods of attaching inserts to tool shank. 3 + 2

6. (*a*) Explain the term Grain, Grade and Structure with relation to grinding wheel. Also explain the term truing and dressing on related to grinding wheel. 5 + 3

(*b*) Define the term weldability. Explain the affect of alloying elements in weldability. 2 + 2

(*c*) Give the reasons for development of thermal stresses in welds. How these stresses can be measured and explain the methods of minimising them ? 4 + 4

7. (*a*) Discuss the mechanism of material removal in electro discharge machining process. 5

(*b*) Name different types of lasers used for material processing applications ? Describe how the process can be used for machining purpose. 4 + 4

(*c*) Discuss in detail the working principle of main components of ultrasonic drilling machine with neat sketches. Explain why the ductile materials crode less for brittle material in USM process. 4 + 3

8. (*a*) Discuss the principle and the process of diffusion bonding process. 5

(*b*) What is resistance welding ? Explain the four period resistance welding cycle. 3 + 2

(*c*) What do you understand by the term 'Heat affected zone' in welding ? What are its effect ? 2 + 3

(*d*) When and why parts are preheated before welding ? 5

Group C

9. Briefly explain the following : 10×2

(*i*) Proof stress

(*ii*) Casting yield

(*iii*) Expandable graphite mould

(*iv*) Master pattern

(*v*) Masking technique used in ECM

(*vi*) Function of back-up-roll

(*vii*) Stereolithography technique

(*viii*) High velocity forming of metals

(*ix*) Cold and hot metal spinning

(*x*) Plain strain deformation