CENTRAL POLYTECHNIC COLLEGE,THARAMANI – 600113.

(An Autonomous Institution)

DEPARTMENT OF MECHANICAL ENGINEERING (CAD)

QUESTION BANK

EMC31010 – MANUFACTURING TECHNOLOGY-I

(E – SCHEME)

U.NO	Q NO	QUESTIONS
1	1	Which material is most commonly used for patterns in short-run production? (a) Wood (b) Steel (c) Graphite (d) Ceramic **Ans:Graphite**
1	2	The parameter primarily affecting arc penetration is (a) Welding current (b) Arc voltage (c) Travel angle (d) Humidity **Ans:Welding current**
1	3	TIG electrodes are commonly alloyed with (a) Thoria or ceria (b) Zinc (c) Lead (d) Magnesium **Ans:Thoria or ceria**
1	4	Resistance seam welding produces (a) A continuous weld (b) Intermittent nuggets only (c) Brazed joint (d) No heat affected zone **Ans:Intermittent nuggets only**
1	5	Backhand welding technique means the torch is inclined (a) Opposite to the direction of travel (b) Same as travel (c) Perpendicular only (d) Random **Ans:Opposite to the direction of travel**
1	6	A major advantage of MIG over SMAW is (a) Higher deposition rate (b) Lower equipment cost (c) No shielding needed (d) Immutable polarity **Ans:Higher deposition rate**
1	7	Arc length in SMAW is roughly equal to (a) Diameter of the electrode core (b) Twice the electrode diameter (c) Half the electrode diameter (d) Irrelevant **Ans:Diameter of the electrode core**
1	8	Post-weld heat treatment can be used to (a) Relieve residual stresses (b) Increase hardenability of all steels (c) Remove alloying elements (d) Create porosity **Ans:Relieve residual stresses**
1	9	The function of flux coating in SMAW is to (a) Stabilize arc and provide shielding (b) Increase current (c) Cool the weld pool (d) Act only as filler **Ans:Stabilize arc and provide shielding**
1	10	Which personal protective item is mandatory for arc welding? (a) Face shield with proper filter (b) Ear plugs only (c) Rubber gloves only (d) Respirator only **Ans:Face shield with proper filter**

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1	11	Arc blow is more common with (a) DC welding (b) AC welding (c) Gas welding (d) Laser welding **Ans:DC welding**
1	12	Which current type is preferred for welding aluminium with TIG? (a) AC (b) DCEN (c) DCEP (d) Pulsed DC only **Ans:AC**
1	13	Preheating is recommended to (a) Reduce cooling rate and cracking (b) Increase spatter (c) Increase hardness only (d) Make arc starting easier only **Ans:Reduce cooling rate and cracking**
1	14	Undercut is a defect that appears as (a) Groove along weld toe (b) Excess metal reinforcement (c) Crater at weld end (d) Overlap of metal **Ans:Groove along weld toe**
1	15	Porosity in welds is caused mainly by (a) Entrapped gas (b) Excess heat input (c) Too small electrode (d) High current only **Ans:Entrapped gas**
1	16	Electrode classification E6013 indicates (a) Tensile strength 60 ksi, position 1, flux type 3 (b) Tensile 80 ksi, position 3, flux 1 (c) Stainless electrode (d) Aluminium electrode **Ans:Tensile strength 60 ksi, position 1, flux type 3**
1	17	Weld symbol for a fillet weld is (a) A right-angled triangle (b) A circle (c) A square (d) A hexagon **Ans:A right-angled triangle**
1	18	Butt, lap and tee are (a) Joint types (b) Weld symbols (c) Electrode types (d) Defects **Ans:Joint types**
1	19	Shell moulding uses resin-coated sand and provides (a) Good surface finish & accuracy (b) Very low strength (c) No cores possible (d) Only very large parts **Ans:Good surface finish & accuracy**
1	20	Hydrogen cracking in welds is promoted by (a) High restraint and diffusible hydrogen (b) High preheat (c) Dry electrodes (d) Austenitic filler **Ans:High restraint and diffusible hydrogen**

U.NO	Q NO	QUESTIONS
1	21	The term fettling in foundry refers to (a) Removing gates, risers and cleaning (b) Pouring metal (c) Mould ram-up (d) Pattern making **Ans:Removing gates, risers and cleaning**
1	22	Rapping allowance is given because (a) Pattern is shaken before withdrawal (b) Metal shrinks (c) Machining needed (d) Cores swell **Ans:Pattern is shaken before withdrawal**
1	23	In sand casting, a typical vent is provided to (a) Allow gases to escape (b) Feed metal (c) Support cores (d) Locate gating **Ans:Allow gases to escape**
1	24	The function of a choke in gating is to (a) Regulate flow rate (b) Collect slag (c) Feed shrinkage (d) Vent gases **Ans:Regulate flow rate**
1	25	For stainless steels, to avoid sensitization, welding practice often uses (a) Low heat input and stabilized grades (b) High heat input and slow cooling (c) No shielding gas (d) Copper electrodes **Ans:Low heat input and stabilized grades**
1	26	Full mould (lost foam) casting uses patterns made of (a) Polystyrene (foam) (b) Wax (c) Sandstone (d) Plaster of Paris **Ans:Polystyrene (foam)**
1	27	The heat-affected zone (HAZ) is the region (a) Not melted but microstructurally changed (b) Completely melted and solidified (c) Unaffected base metal (d) Only flux layer **Ans:Not melted but microstructurally changed**
1	28	In GMAW with CO2 shielding, arc is usually (a) More penetrating but spattery (b) Softer with less penetration (c) Not stable (d) Cold **Ans:Not stable**
1	29	The most suitable flame for welding mild steel is (a) Neutral flame (b) Oxidizing flame (c) Carburizing flame (d) No flame **Ans:Neutral flame**
1	30	The collapsibility of moulding sand is desirable to (a) Avoid hot tears during contraction (b) Increase green strength (c) Reduce permeability (d) Increase hardness **Ans:Avoid hot tears during contraction**

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1	31	Inclusion defects are minimized by using (a) Proper gating and filters (b) Slow superheat (c) Low riser (d) No slag removal **Ans:Proper gating and filters**
1	32	Exothermic sleeves around risers are used to (a) Keep the riser hot for feeding (b) Cool the riser (c) Reduce permeability (d) Increase gas evolution **Ans:Keep the riser hot for feeding**
1	33	Chvorinov's rule relates solidification time to (a) Volume-to-surface area ratio (b) Pouring temperature only (c) Sand grain size only (d) Riser height only **Ans:Volume-to-surface area ratio**
1	34	Welding position '1G' denotes (a) Flat position for groove weld (b) Horizontal fillet (c) Vertical up (d) Overhead **Ans:Flat position for groove weld**
1	35	In TIG welding, filler metal is (a) Added separately as a rod (b) Always part of the tungsten (c) Not required (d) Automatically fed wire only **Ans:Added separately as a rod**
1	36	In gas welding, backfire is a condition when (a) Flame momentarily extinguishes with a pop (b) Hose bursts (c) Gas runs out (d) Regulator freezes **Ans:Flame momentarily extinguishes with a pop**
1	37	The neutral oxy-acetylene flame has an approximate temperature of (a) About 3200°C (b) About 1800°C (c) About 4500°C (d) About 900°C **Ans:About 3200°C**
1	38	A typical binder used in green sand is (a) Bentonite clay (b) Epoxy resin (c) Polyester (d) Sodium silicate **Ans:Bentonite clay**
1	39	Facing sand is applied to (a) Improve surface finish near the pattern (b) Increase permeability throughout (c) Reduce mould hardness (d) Increase moisture uniformly **Ans:Improve surface finish near the pattern**
1	40	Core prints on a pattern are used to (a) Support the core in the mould (b) Vent the mould (c) Feed the casting (d) Locate risers **Ans:Support the core in the mould**

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1	41	Dry sand moulds are preferred when (a) High dimensional accuracy is required (b) Very quick production is needed (c) Low pouring temperature metals are used (d) Cores are unnecessary **Ans:Very quick production is needed**
1	42	Green sand moulding is performed with sand that is (a) Moist and unbaked (b) Dry and baked (c) Oiled and baked (d) Sand mixed with resin **Ans:Moist and unbaked**
1	43	High refractoriness in moulding sand resists (a) Fusing at high temperature (b) Moisture pickup (c) Gas evolution (d) Metal penetration **Ans:Fusing at high temperature**
1	44	Excessive moisture in green sand mainly reduces (a) Permeability (b) Refractoriness (c) Collapsibility (d) Green strength **Ans:Permeability**
1	45	The property of sand that allows gases to escape during pouring is (a) Permeability (b) Cohesiveness (c) Refractoriness (d) Collapsibility **Ans:Permeability**
1	46	The allowance provided to counter metal contraction during solidification is (a) Shrinkage allowance (b) Draft allowance (c) Distortion allowance (d) Rapping allowance **Ans:Distortion allowance**
1	47	Match-plate patterns are commonly made from (a) Aluminium (b) Cast iron (c) Copper (d) Lead **Ans:Aluminium**
1	48	Which pattern type is best for very large castings made in segments? (a) Skeleton pattern (b) Match-plate pattern (c) Cope-and-drag pattern (d) Loose piece pattern **Ans:Skeleton pattern**
1	49	Draft allowance on a pattern is provided to (a) Ease withdrawal from the sand (b) Compensate shrinkage (c) Allow machining later (d) Increase surface finish **Ans:Ease withdrawal from the sand**
1	50	Which of the following is NOT a pattern allowance? (a) Cooling allowance (b) Draft allowance (c) Shrinkage allowance (d) Machining allowance **Ans:Cooling allowance**

U.NO	Q NO	QUESTIONS
2	1	Shear fracture surface in blanking ideally shows (a) Burnish zone + fracture zone (b) Only fracture zone (c) Only burnish zone (d) No zones **Ans:Burnish zone + fracture zone**
2	2	A cam-driven press is often used for (a) High-speed light stampings (b) Large hot forgings (c) Slow heavy draws (d) Open-die work **Ans:High-speed light stampings**
2	3	In hot working, strain rate sensitivity (a) Improves formability (b) Decreases ductility (c) Always causes necking (d) Removes oxide **Ans:Improves formability**
2	4	Roll forging improves (a) Directional grain flow (b) Porosity (c) Segregation (d) Cracking tendency **Ans:Directional grain flow**
2	5	Piercing punch failure is minimized by (a) Proper clearance and sharpness (b) Removing shear (c) Using soft punch material (d) Dry operation always **Ans:Proper clearance and sharpness**
2	6	Channel bending forms (a) U-shaped sections (b) Circular flanges (c) Beads (d) Embossed logos **Ans:Circular flanges**
2	7	Press working safety requires (a) Two-hand controls or guards (b) Open unguarded dies (c) Overriding interlocks (d) Removing light curtains **Ans:Two-hand controls or guards**
2	8	Die setters adjust (a) Alignment and shut height (b) Hardness of sheet (c) Melting temperature (d) Electrical power **Ans:Alignment and shut height**
2	9	Roll forging is most suitable for (a) Preforms before closed-die forging (b) Final finishing of gears (c) Sheet metal cups (d) Wire drawing **Ans:Preforms before closed-die forging**
2	10	A bolster plate in a press (a) Supports and locates the die set (b) Holds the punch (c) Feeds the strip (d) Lubricates the sheet **Ans:Supports and locates the die set**

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2	11	Transfer die operations move (a) Workpiece from station to station between strokes (b) Strip remains stationary (c) Single hit operation (d) Only manual loading **Ans:Workpiece from station to station between strokes**
2	12	Parting off in press work means (a) Separating the finished part from strip (b) Piercing a hole (c) Embossing (d) Coining **Ans:Separating the finished part from strip**
2	13	Trimming is used to (a) Remove excess material after forming (b) Increase thickness (c) Add features (d) Reduce hardness **Ans:Remove excess material after forming**
2	14	Progressive die pitch is (a) Advance of strip per stroke (b) Die clearance (c) Punch radius (d) Shut height **Ans:Advance of strip per stroke**
2	15	Swelling at cup flange indicates (a) Insufficient blank-holder pressure (b) Excessive lubrication (c) Correct drawing (d) Too small punch radius **Ans:Insufficient blank-holder pressure**
2	16	Die life increases with (a) Proper lubrication & alignment (b) Excess tonnage (c) Soft die blocks (d) No stripping plate **Ans:Proper lubrication & alignment**
2	17	Bend allowance accounts for (a) Material elongation in the bend (b) Die clearance (c) Springback (d) Blank thickness change only **Ans:Material elongation in the bend**
2	18	Press tonnage required for blanking increases with (a) Perimeter and thickness (b) Blank area only (c) Die hardness only (d) Lubricant type only **Ans:Perimeter and thickness**
2	19	Angle bending forms (a) A V or L shape (b) A closed ring (c) A helical coil (d) A dome **Ans:A V or L shape**
2	20	Smith forging is usually performed using: (a) Power press (b) Hand hammer (c) Drop hammer (d) Hydraulic press **Ans:Hand hammer**

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2	21	Drawing operation in press work is used to: (a) Bend the sheet (b) Cut the sheet (c) Produce cup-like shapes (d) Join sheets **Ans:Produce cup-like shapes**
2	22	Which die type performs multiple operations in sequence along the strip? (a) Progressive die (b) Compound die (c) Transfer die (d) Coining die **Ans:Progressive die**
2	23	Roll forging operation feed is measured in (a) Reduction per pass (b) Strokes per minute (c) Amps (d) Degrees **Ans:Degrees**
2	24	Piercing vs blanking difference is that (a) Piercing removes scrap; blank is product (b) Piercing gives product; blank is scrap (c) Both same (d) Blanking always after piercing **Ans:Piercing removes scrap; blank is product**
2	25	Hydraulic presses are preferred for (a) Long stroke and controllable force (b) Very high speed (c) Energy storage (d) Impact blows **Ans:Long stroke and controllable force**
2	26	Annealing after cold work is used to (a) Restore ductility (b) Increase work hardening (c) Decrease grain growth always (d) Create martensite **Ans:Restore ductility**
2	27	Neutral axis in bending shifts (a) Toward the inside radius (b) Toward the outside (c) Remains centered (d) Randomly **Ans:Toward the inside radius**
2	28	Shut height of a press is (a) Distance between ram and bed at BDC (b) Height of die block (c) Stroke length (d) Press opening at TDC **Ans:Distance between ram and bed at BDC**
2	29	Fine blanking requires (a) V-ring and high pressure pads (b) Large clearance (c) Hot sheet (d) No support plate **Ans:V-ring and high pressure pads**
2	30	Ironing in cans manufacturing (a) Reduces wall thickness after drawing (b) Increases bottom thickness (c) Adds holes (d) Makes embossing **Ans:Reduces wall thickness after drawing**

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2	31	Wrinkle in flange during drawing indicates (a) Low blank holder force or friction (b) Excess clearance (c) Too high drawing ratio only (d) Perfect forming **Ans:Low blank holder force or friction**
2	32	Cupping test is used to assess (a) Sheet metal formability (b) Tensile strength only (c) Hardness only (d) Impact toughness **Ans:Sheet metal formability**
2	33	Coining pressure compared to bending (a) Is much higher (b) Is similar (c) Is lower (d) Is negligible **Ans:Is much higher**
2	34	Fine blanking achieves (a) Smooth, nearly shear-free edges (b) Large burrs (c) Only rough cuts (d) Hot shearing **Ans:Smooth, nearly shear-free edges**
2	35	Deep drawing is characterized by (a) Cup height greater than diameter of punch radii control (b) Very small punch travel (c) Only hot forming (d) No blank holder needed **Ans:No blank holder needed**
2	36	Isothermal forging maintains (a) Workpiece and die at similar temperature (b) Workpiece at room temperature (c) Dies at cryogenic temperature (d) Only vacuum **Ans:Workpiece and die at similar temperature**
2	37	Hot working is typically performed (a) Above recrystallization temperature (b) Below room temperature (c) At cryogenic temperature (d) Just below melting point **Ans:Above recrystallization temperature**
2	38	A key advantage of hot working over cold working is (a) Elimination of work hardening (b) Better surface finish (c) Tighter tolerances (d) No oxidation **Ans:Elimination of work hardening**
2	39	Press brake is commonly used for (a) Bending sheet metal (b) Blanking (c) Upsetting (d) Swaging wire **Ans:Bending sheet metal**
2	40	Smith forging is also known as (a) Hand forging (b) Drop forging (c) Upset forging (d) Roll forging **Ans:Hand forging**

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2	41	Drop forging uses (a) A falling hammer and dies (b) Hydraulic extrusion (c) Rotating rolls (d) Explosive forming **Ans:A falling hammer and dies**
2	42	Upset forging primarily increases (a) Cross-sectional area (b) Length (c) Porosity (d) Grain size only **Ans:Cross-sectional area**
2	43	Roll forging reduces (a) Cross-section through rolling dies (b) Temperature to room temperature (c) Length to zero (d) Ductility **Ans:Cross-section through rolling dies**
2	44	In hot rolling, scale formation is mainly due to (a) Oxidation of the surface (b) Work hardening (c) Carbide precipitation (d) Hydrogen embrittlement **Ans:Oxidation of the surface**
2	45	Flash is a characteristic of (a) Impression die forging (b) Open die forging (c) Press braking (d) Wire drawing **Ans:Impression die forging**
2	46	Press capacity is commonly rated in (a) Tonnage (b) Watts (c) Litres (d) Amperes **Ans:Tonnage**
2	47	In a hydraulic press, force is generated by (a) Fluid pressure on a ram (b) Kinetic energy of a flywheel (c) Elastic spring (d) Centrifugal force **Ans:Fluid pressure on a ram**
2	48	Blanking operation produces (a) A part from sheet (the blank) (b) A hole in the sheet (c) A beveled edge (d) A fold **Ans:A part from sheet (the blank)**
2	49	Piercing operation produces (a) A hole in the sheet (b) A finished blank (c) A rib (d) A flange **Ans:A hole in the sheet**
2	50	Clearance in shearing depends primarily on (a) Sheet thickness (b) Ram speed (c) Die material (d) Lubricant type **Ans:Sheet thickness**

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3	1	Full annealing produces (a) Coarse pearlite with maximum softness (b) Fine bainite with high strength (c) Martensite (d) Austenite at room temp **Ans:Coarse pearlite with maximum softness**
3	2	Case depth in carburizing depends on (a) Time and temperature (b) Only carbon content of steel (c) Only quench medium (d) Only surface finish **Ans:Time and temperature**
3	3	Induction hardening is most effective for (a) Medium carbon steels (b) Low carbon steels without carburizing (c) Aluminium (d) Copper **Ans:Medium carbon steels**
3	4	Carburizing is followed typically by (a) Quench and temper (b) Anneal and slow cool only (c) No further treatment (d) Austemper only **Ans:No further treatment**
3	5	Tempered martensite is (a) Stronger than pearlite but less brittle than martensite (b) Brittler than untempered (c) Same as ferrite (d) Austenite **Ans:Stronger than pearlite but less brittle than martensite**
3	6	Lubricant in PM helps to (a) Reduce die wall friction during compaction (b) Increase porosity after sintering (c) React chemically to harden (d) Increase oxide content **Ans:Reduce die wall friction during compaction**
3	7	Powder size is often measured by (a) Sieve analysis (b) Charpy impact (c) Rockwell test (d) Ultrasonic C-scan **Ans:Sieve analysis**
3	8	Hot isostatic pressing (HIP) combines (a) High temperature and high gas pressure (b) Low pressure and low temperature (c) Vibration and cooling (d) Rolling and pressing **Ans:High temperature and high gas pressure**
3	9	Cold isostatic pressing applies pressure (a) Hydrostatically in all directions (b) Only uniaxially (c) Thermally (d) By hammering **Ans:Hydrostatically in all directions**
3	10	Sintering atmosphere of hydrogen is (a) Reducing (b) Oxidizing (c) Inert only (d) Carburizing **Ans:Reducing**

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3	11	Residual austenite is reduced by (a) Cold treatment (sub-zero) (b) Higher austenitizing (c) No quench (d) Slower cooling through Ms **Ans:Cold treatment (sub-zero)**
3	12	Sintering neck growth improves (a) Strength and density (b) Porosity only (c) Oxide inclusions (d) Grain size only **Ans:Strength and density**
3	13	Quench cracks are minimized by (a) Proper preheat and tempering (b) No tempering (c) Very fast water quench always (d) Overheating **Ans:Proper preheat and tempering**
3	14	Green sand moulding is preferred because it is: (a) Expensive (b) Reusable (c) Difficult to prepare (d) Non-plastic **Ans:Reusable**
3	15	Electroless nickel infiltration adds (a) Corrosion resistance in pores (b) Carburized case (c) Nitride layer (d) Decarburized layer **Ans:Corrosion resistance in pores**
3	16	Decarburization during heat treatment leads to (a) Lower surface hardness (b) Higher surface hardness (c) No effect (d) Carbide network at surface **Ans:Lower surface hardness**
3	17	Which welding process uses non-consumable tungsten electrode? (a) MIG (b) TIG (c) SMAW (d) Submerged arc welding **Ans:TIG**
3	18	Drop forging is mainly used for: (a) Thin sheets (b) Complex shapes (c) Precision parts (d) Mass production **Ans:Mass production**
3	19	Which heat treatment process increases toughness by heating below critical point? (a) Normalizing (b) Tempering (c) Carburizing (d) Quenching **Ans:Tempering**
3	20	Sintering in powder metallurgy improves: (a) Color (b) Corrosion (c) Density and strength (d) Weight **Ans:Density and strength**

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3	21	Powder metallurgy typically aims for (a) Near-net shape (b) Casting risers (c) Arc welding (d) Drop forging **Ans:Near-net shape**
3	22	Powder metallurgy parts often require (a) Secondary operations like sizing/impregnation (b) Arc welding (c) Hot forging always (d) Carburizing never **Ans:Secondary operations like sizing/impregnation**
3	23	Martensite start temperature (Ms) is (a) Temperature where martensite begins to form on cooling (b) Start of pearlite (c) Boiling point of oil (d) A1 **Ans:Temperature where martensite begins to form on cooling**
3	24	Nitriding advantage over carburizing is (a) Less distortion (no quench needed) (b) Deeper case for same time (c) Lower fatigue strength (d) More decarburization **Ans:Less distortion (no quench needed)**
3	25	A sintering aid in PM for WC-Co is (a) Cobalt binder (b) Chromium nitride (c) Sodium chloride (d) Lead **Ans:Cobalt binder**
3	26	Powder compacts with density gradients are improved by (a) Double-action pressing (b) Lowering pressure (c) Removing lubricant (d) Using coarser powder only **Ans:Using coarser powder only**
3	27	Hardenability represents (a) Depth to which steel hardens on quenching (b) Maximum attainable hardness (c) Toughness (d) Ductility **Ans:Depth to which steel hardens on quenching**
3	28	Tempering at too high temperature can cause (a) Softening and over-tempering (b) Increased hardness (c) Martensite reformation (d) No change **Ans:Softening and over-tempering**
3	29	Bainite forms at (a) Intermediate temperatures between pearlite and martensite (b) Very high temperatures (c) Room temperature only (d) Above Acm **Ans:Intermediate temperatures between pearlite and martensite**
3	30	Austempering quench medium commonly is (a) Molten salt bath (b) Water (c) Brine (d) Air **Ans:Molten salt bath**

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3	31	Quenching in oil compared to water gives (a) Slower cooling and less distortion (b) Faster cooling (c) No HAZ (d) More cracking **Ans:Slower cooling and less distortion**
3	32	TTT diagrams plot (a) Temperature vs time of transformations (b) Stress vs strain (c) Voltage vs current (d) Depth vs time **Ans:Temperature vs time of transformations**
3	33	Reduction method produces powders by (a) Reducing metal oxides (b) Melting and spraying (c) Electroplating (d) Grinding only **Ans:Reducing metal oxides**
3	34	Full annealing involves (a) Heating above A3/Acm and slow cooling (b) Heating below A1 then quench (c) Rapid cooling from above A1 (d) No soaking **Ans:Heating above A3/Acm and slow cooling**
3	35	Normalizing steel results in (a) Refined, uniform pearlitic structure (b) Highest hardness (c) Full annealing softness (d) Austenite retention **Ans:Refined, uniform pearlitic structure**
3	36	Isothermal annealing is used to (a) Improve ductility and refine pearlite (b) Form martensite (c) Create bainite only (d) Harden copper **Ans:Improve ductility and refine pearlite**
3	37	TIG is unrelated to (a) Powder metallurgy (b) Heat treatment (c) Sintering (d) Compaction **Ans:Compaction**
3	38	Typical PM advantage is (a) Near-net shape with minimal scrap (b) Always higher density than wrought (c) Unlimited part size (d) High ductility **Ans:Near-net shape with minimal scrap**
3	39	Green strength refers to (a) Strength of compact before sintering (b) Strength after sintering (c) Fluidity of melt (d) Hardness after heat treatment **Ans:Strength of compact before sintering**
3	40	Process annealing is used to (a) Remove work hardening in low-carbon steel (b) Harden tool steel (c) Precipitation harden Al (d) Create martensite **Ans:Remove work hardening in low-carbon steel**

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3	41	A common lubricant in PM compaction is (a) Zinc stearate (b) Mercury (c) Lead oxide (d) NaCl **Ans:Zinc stearate**
3	42	Sizing after sintering is used to (a) Improve dimensional accuracy (b) Add lubricants (c) Remove oxides (d) Change composition **Ans:Improve dimensional accuracy**
3	43	Sintering is performed (a) Below melting point to bond particles (b) Above melting point (c) At room temperature (d) Only in vacuum **Ans:Below melting point to bond particles**
3	44	Compacting in powder metallurgy aims to (a) Achieve desired density and shape (b) Melt the powder (c) Remove all porosity (d) Create oxide layers **Ans:Achieve desired density and shape**
3	45	Electrolytic deposition for powders yields (a) High purity powders (b) Largest particle size (c) Lowest purity (d) Always brittle powders **Ans:High purity powders**
3	46	Atomization is a method used to (a) Produce metal powders (b) Sinter compacts (c) Harden steels (d) Coat powders **Ans:Produce metal powders**
3	47	Precipitation hardening is typical of (a) Al-Cu alloys (b) Plain carbon steels (c) Cast iron only (d) Pure copper **Ans:Al-Cu alloys**
3	48	Infiltration introduces (a) A lower melting metal into pores (b) Gases to pores (c) Ceramics into pores (d) Flakes to strengthen **Ans:A lower melting metal into pores**
3	49	Spheroidize annealing produces (a) Globular carbides in ferrite (b) Martensite (c) Bainite (d) Retained austenite **Ans:Globular carbides in ferrite**
3	50	A design rule for PM parts is to (a) Avoid sharp changes in section (b) Include deep undercuts (c) Use long thin walls (d) Vary thickness abruptly **Ans:Avoid sharp changes in section**

U.NO	Q NO	QUESTIONS
4	1	Spot facing is commonly done using (a) End mill/counterbore (b) Twist drill only (c) Tap (d) Reamer **Ans:Twist drill only**
4	2	Built-up edge in drilling causes (a) Poor finish and size error (b) Improved accuracy (c) Lower torque always (d) No effect **Ans:Poor finish and size error**
4	3	Runout in drilling leads to (a) Oversize holes (b) Undersize holes always (c) No change (d) Tapered holes smaller **Ans:Undersize holes always**
4	4	Cutting speed for drilling is based on (a) Peripheral speed at drill diameter (b) Spindle torque (c) Machine power (d) Chip load only **Ans:Machine power**
4	5	Drill jig provides (a) Accurate location and guidance for drill (b) Power to the spindle (c) Lubrication (d) Coolant only **Ans:Coolant only**
4	6	Tapping creates (a) Internal threads (b) External threads (c) Countersink (d) Counterbore **Ans:External threads**
4	7	Drill sleeves are used when (a) Drill taper is smaller than spindle taper (b) Drill taper larger (c) Using chucks (d) Using collets **Ans:Drill taper larger**
4	8	Boring operation is used to (a) Enlarge and improve accuracy of an existing hole (b) Start a new hole (c) Create threads (d) Spot face **Ans:Create threads**
4	9	Coolant application in drilling is most effective when (a) Delivered to cutting edges and chip gullet (b) Sprayed on chuck (c) Flood on table (d) Random **Ans:Random**
4	10	Coolant through spindle is common in (a) CNC machining centers (b) Bench drills (c) Hand drills (d) Shapers **Ans:Hand drills**

U.NO	Q NO	QUESTIONS
4	11	Spot drill angle compared to standard drill (a) Is larger for stiffness (b) Is smaller (c) Same (d) Irrelevant **Ans:Is larger for stiffness**
4	12	For tough alloys, recommended cutting speed is (a) Lower than for mild steel (b) Higher (c) Same (d) Irrelevant **Ans:Lower than for mild steel**
4	13	Pilot holes help to (a) Guide larger drills and reduce thrust (b) Increase burrs (c) Increase runout (d) Reduce accuracy **Ans:Guide larger drills and reduce thrust**
4	14	Drill bushes in jigs are made of (a) Hardened steel (b) Aluminium (c) Copper (d) Lead **Ans:Hardened steel**
4	15	Spot facing operation aims to (a) Provide flat seating surface (b) Create threads (c) Drill deep holes (d) Tap holes **Ans:Tap holes**
4	16	Powder metallurgy is especially suitable for making: (a) Large castings (b) Porous bearings (c) Forged tools (d) Sheet metal parts **Ans:Porous bearings**
4	17	Carbide tools are preferred because they: (a) Are cheaper (b) Withstand higher temperatures (c) Rust easily (d) Are softer **Ans:Withstand higher temperatures**
4	18	Cutting fluids are used mainly to: (a) Polish surface (b) Increase tool hardness (c) Reduce heat and friction (d) Change tool shape **Ans:Reduce heat and friction**
4	19	Spot facing is done to: (a) Polish the hole (b) Increase hardness (c) Create threads (d) Produce flat surface for seating **Ans:Produce flat surface for seating**
4	20	A radial drilling machine is used for: (a) Tapping only (b) Small holes (c) Thread cutting (d) Large workpieces **Ans:Large workpieces**

U.NO	Q NO	QUESTIONS
4	21	Orthogonal cutting differs from oblique cutting in: (a) Chip thickness (b) Machine used (c) Tool geometry (d) Number of cutting edges **Ans:Tool geometry**
4	22	Carbide tools are preferred because they: (a) Rust easily (b) Are cheaper (c) Are softer (d) Withstand higher temperatures **Ans:Withstand higher temperatures**
4	23	Spot drilling is done to (a) Create accurate starting point (b) Finish hole (c) Tap hole (d) Bore large diameters **Ans:Finish hole**
4	24	Tool wear monitoring in drilling tracks (a) Torque/thrust increase (b) Spindle temperature only (c) Coolant color (d) Machine color **Ans:Machine color**
4	25	Feeds in drilling are specified in (a) mm/rev (b) mm/min only (c) rev/min only (d) N·m **Ans:mm/min only**
4	26	Bench drilling machine is (a) Small drill on a bench (b) Radial drill (c) CNC machining center (d) Portable hand drill only **Ans:Portable hand drill only**
4	27	Gang drilling machine has (a) Multiple drills on a common table (b) Only one spindle (c) CNC axes only (d) Rotary table only **Ans:Rotary table only**
4	28	Drills most commonly used are (a) Twist drills (b) Flat spade drills only (c) Gun drills only (d) Trepan drills only **Ans:Trepan drills only**
4	29	Oblique cutting has chip flow (a) At an angle to cutting edge (b) Normal to cutting edge (c) Not defined (d) Parallel to velocity **Ans:Normal to cutting edge**
4	30	Specific cutting energy generally (a) Decreases with increasing feed (b) Increases with depth (c) Unaffected by chip load (d) Independent of material **Ans:Increases with depth**

U.NO	Q NO	QUESTIONS
4	31	Minimum chip thickness concept is important in (a) Micro-machining (b) Heavy roughing (c) Manual filing (d) Forging **Ans:Manual filing**
4	32	High speed steel is best for (a) Interrupted cuts and toughness (b) Very high speed dry cuts always (c) Abrasive composites (d) Only drilling wood **Ans:Only drilling wood**
4	33	Cemented carbides are (a) WC particles bonded with Co (b) HSS with Coating (c) Ceramic oxides only (d) Cermets only **Ans:HSS with Coating**
4	34	Point angle of a standard twist drill (for steel) is (a) 118° (approx.) (b) 30° (c) 45° (d) 170° **Ans:30°**
4	35	Single point cutting tool nomenclature includes (a) Back rake, side rake, relief angles (b) Helix angle only (c) Point angle only (d) No rake **Ans:Helix angle only**
4	36	Cutting fluids primarily (a) Cool and lubricate the cutting zone (b) Increase hardness of tool (c) Reduce spindle speed only (d) Change tool geometry **Ans:Change tool geometry**
4	37	Crater wear occurs on (a) Rake face due to chip flow (b) Flank face (c) Tool shank (d) Work holder **Ans:Flank face**
4	38	Tool life is commonly related to cutting speed by (a) Taylor's equation (b) Hooke's law (c) Bernoulli's principle (d) Fourier law **Ans:Taylor's equation**
4	39	Positive rake angle generally (a) Reduces cutting force (b) Increases built-up edge always (c) Eliminates chip flow (d) Increases tool wear only **Ans:Increases tool wear only**
4	40	Shear plane angle affects (a) Chip thickness and cutting force (b) Tool material only (c) Coolant type (d) Machine color **Ans:Chip thickness and cutting force**

U.NO	Q NO	QUESTIONS
4	41	Orthogonal cutting assumes (a) Cutting edge perpendicular to cutting velocity (b) Oblique angle < 0° (c) Zero rake always (d) No chip formation **Ans:Cutting edge perpendicular to cutting velocity**
4	42	Built-up edge is promoted by (a) Low cutting speed and high friction (b) High cutting speed with coolant (c) Sharp tools and coatings (d) Negative rake only **Ans:Low cutting speed and high friction**
4	43	Chisel edge of a drill (a) Does not cut; extrudes material (b) Is the main cutting lip (c) Guides the drill (d) Holds coolant **Ans:Is the main cutting lip**
4	44	Flank wear occurs on (a) Relief (flank) face of tool (b) Rake face (c) Nose radius (d) Shank **Ans:Relief (flank) face of tool**
4	45	Reaming operation is for (a) Finishing and sizing a hole (b) Starting a hole (c) Creating threads (d) Spot facing only **Ans:Starting a hole**
4	46	Drill chucks are held in spindles via (a) Taper (Morse/Jacobs) (b) Threaded rods (c) Keys only (d) Bolted flanges **Ans:Taper (Morse/Jacobs)**
4	47	Radial drilling machine is suited for (a) Large, heavy jobs (b) Tiny watch parts (c) Wire EDM (d) Gear shaping only **Ans:Gear shaping only**
4	48	Multi-spindle drills are used for (a) Drilling many holes simultaneously (b) Gun drilling only (c) Tapping only (d) Reaming only **Ans:Drilling many holes simultaneously**
4	49	Drill margin refers to (a) Narrow land along outer edges (b) Web thickness (c) Chisel edge (d) Helix angle **Ans:Narrow land along outer edges**
4	50	For brittle materials, the recommended drill point angle is (a) Larger to reduce chipping (b) Very small (c) Unchanged (d) None **Ans:Larger to reduce chipping**

U.NO	Q NO	QUESTIONS
5	1	Angle grinder is commonly used for (a) Grinding and cutting with discs (b) Drilling holes (c) Turning (d) Planing **Ans:Grinding and cutting with discs**
5	2	Screwdrivers (power) are used for (a) Driving screws quickly (b) Knurling (c) Turning (d) Grinding **Ans:Driving screws quickly**
5	3	Tool post types include (a) Single, four-way, quick-change (b) Only single-type (c) Only four-way (d) Only quick-change **Ans:Single, four-way, quick-change**
5	4	Depth of cut, feed and speed together define (a) Material removal rate (b) Thread pitch (c) Tool hardness (d) Lead angle **Ans:Material removal rate**
5	5	Automatic cross feed enables (a) Uniform facing and turning (b) Manual hand feed only (c) Threading only (d) Taper only **Ans:Uniform facing and turning**
5	6	Turning speed (rpm) is selected from (a) Cutting speed and work diameter (b) Feed only (c) Depth only (d) Tool nose radius only **Ans:Cutting speed and work diameter**
5	7	Cutting fluid in turning helps to (a) Cool and lubricate (b) Increase runout (c) Loosen chuck (d) Clean coolant tank only **Ans:Cool and lubricate**
5	8	Tool overhang should be (a) As small as possible (b) As large as possible (c) Equal to work length (d) Irrelevant **Ans:As small as possible**
5	9	Work between centers uses (a) Lathe centers and a drive (b) Only chuck (c) Only collet (d) Only faceplate **Ans:Lathe centers and a drive**
5	10	Cartridge type live center contains (a) Bearings to rotate with work (b) Fixed dead point (c) Magnet (d) Gear **Ans:Bearings to rotate with work**

U.NO	Q NO	QUESTIONS
5	11	Turning hard materials often uses (a) CBN or ceramic tools (b) HSS always (c) Wood tools (d) Plastic inserts **Ans:CBN or ceramic tools**
5	12	Knurling feed is (a) High to emboss pattern (b) Very low (c) Same as turning (d) Zero **Ans:Very low**
5	13	Short work held in chuck must (a) Project minimum length for stiffness (b) Project maximum length (c) Be unsupported (d) Be hammered in **Ans:Project minimum length for stiffness**
5	14	Power tool 'blower' mainly serves to (a) Clear chips/dust (b) Cut threads (c) Turn work (d) Grind **Ans:Clear chips/dust**
5	15	Heat gun among power tools is used for (a) Paint stripping/shrink fit (b) Cutting steel (c) Mixing concrete (d) Measuring temperature **Ans:Paint stripping/shrink fit**
5	16	Lathe lead screw pitch determines (a) Thread pitches possible (b) Spindle speed (c) Tool nose radius (d) Chuck size **Ans:Thread pitches possible**
5	17	Tool wear on lathes is minimized by (a) Correct speed, feed, coolant (b) Excess speed (c) Dull tools (d) Dry cut always **Ans:Correct speed, feed, coolant**
5	18	The apron in a lathe is part of the: (a) Tailstock (b) Bed (c) Headstock (d) Carriage **Ans:Carriage**
5	19	Travelling steady supports (a) Work near the cutting point (b) Tailstock (c) Toolpost (d) Chuck **Ans:Work near the cutting point**
5	20	Depth of cut in turning is (a) Half the reduction in diameter (b) Equal to reduction in diameter (c) Twice reduction (d) Independent **Ans:Half the reduction in diameter**

U.NO	Q NO	QUESTIONS
5	21	Thread cutting on a lathe uses (a) Leadscrew synchronized with spindle (b) Random feed (c) Only cross feed (d) Tailstock feed **Ans:Leadscrew synchronized with spindle**
5	22	Taper turning by offset method uses (a) Tailstock set-over (b) Form tool (c) Taper attachment only (d) Compound rest only **Ans:Tailstock set-over**
5	23	Knurling operation produces (a) Regular textured pattern (b) Internal thread (c) External taper (d) Flat face **Ans:Regular textured pattern**
5	24	Types of centres include (a) Live, dead and half centres (b) Only dead centre (c) Only live centre (d) Only revolving centre **Ans:Live, dead and half centres**
5	25	Catch plate and carrier are used for (a) Driving work between centers (b) Holding drills (c) Holding tools (d) Clamping fixtures **Ans:Driving work between centers**
5	26	Faceplate is used to (a) Hold irregular workpieces (b) Hold twist drills (c) Hold reamers (d) Grip small bar **Ans:Hold irregular workpieces**
5	27	Four-jaw chuck is preferred for (a) Eccentric or square jobs (b) Round bars only (c) Thin sheets (d) Wood only **Ans:Eccentric or square jobs**
5	28	Three-jaw chuck is (a) Self-centering (b) Independent jaws (c) Not used on lathes (d) Magnetic **Ans:Self-centering**
5	29	Tailstock supports (a) Work with centers and drills (b) Only tool post (c) Gearbox (d) Chuck **Ans:Work with centers and drills**
5	30	Compound rest is useful for (a) Taper turning and tool setting (b) Facing only (c) Drilling (d) Boring bar support only **Ans:Taper turning and tool setting**

U.NO	Q NO	QUESTIONS
5	31	Cross slide provides (a) Transverse feed (b) Longitudinal feed (c) Compound angle only (d) No feed **Ans:Transverse feed**
5	32	Apron mechanism controls (a) Carriage movements and feed (b) Spindle speed (c) Chuck jaws (d) Tailstock barrel **Ans:Carriage movements and feed**
5	33	Quick-change gear box is used for (a) Rapid selection of feeds and threads (b) Changing spindle bearings (c) Tailstock offset (d) Coolant control **Ans:Rapid selection of feeds and threads**
5	34	Back-geared headstock provides (a) Low speeds with high torque (b) High speeds only (c) Only threading (d) No change in torque **Ans:Low speeds with high torque**
5	35	Headstock houses (a) Spindle and gear train (b) Tailstock barrel only (c) Apron (d) Leadscrew **Ans:Spindle and gear train**
5	36	A centre lathe primarily performs (a) Turning operations (b) Milling (c) Planing (d) Grinding only **Ans:Turning operations**
5	37	Facing operation produces (a) Flat surface at end of work (b) Cylindrical surface (c) Thread (d) Taper **Ans:Flat surface at end of work**
5	38	CNC lathes differ by (a) Programmable control of motions (b) Manual gears only (c) No spindle (d) No tailstock possible **Ans:Programmable control of motions**
5	39	Boring on a lathe (a) Enlarges an existing hole (b) Drills a new hole (c) Faces a surface (d) Knurls **Ans:Enlarges an existing hole**
5	40	Feed in turning is expressed in (a) mm/rev (b) mm/min only (c) rev/min (d) N·m **Ans:mm/rev**

U.NO	Q NO	QUESTIONS
5	41	Steady rest is used to (a) Support long workpieces (b) Hold tools (c) Drive the work (d) Change speed **Ans:Support long workpieces**
5	42	Taper turning using compound rest is suitable for (a) Short, steep tapers (b) Long gentle tapers (c) Threads (d) Knurls **Ans:Short, steep tapers**
5	43	Chamfering on a lathe produces (a) Beveled edge (b) Knurled surface (c) Internal thread (d) Concave radius **Ans:Beveled edge**
5	44	Lathe centers are usually made of (a) Hardened steel (b) Aluminium (c) Brass (d) Lead **Ans:Hardened steel**
5	45	Spindle nose carries (a) Chuck/faceplate (b) Tailstock (c) Leadscrew (d) Apron **Ans:Chuck/faceplate**
5	46	Mandrel is used to (a) Hold hollow work for machining (b) Hold drills (c) Hold centers (d) Measure taper **Ans:Hold hollow work for machining**
5	47	Work holding device to hold very small diameter stock (a) Collet chuck (b) Faceplate (c) Four-jaw chuck (d) Drive plate **Ans:Collet chuck**
5	48	Carriage consists of (a) Saddle, cross-slide, compound, apron (b) Headstock and tailstock (c) Base and column (d) Slideways only **Ans:Saddle, cross-slide, compound, apron**
5	49	Quick-change tool post enables (a) Rapid tool swapping (b) Reverse spindle (c) Tailstock movement (d) Headstock change **Ans:Rapid tool swapping**
5	50	Chuck runout is checked by (a) Dial indicator (b) Vernier caliper (c) Feeler gauge (d) Micrometer screw only **Ans:Dial indicator**

SHORT ANSWER QUESTIONS 3 marks

PART B UNIT I

1 Describe the step-by-step procedure of sand casting with a neat sketch.

2 Describe the various types of patterns based on their construction and material.

3 Discuss the properties and selection criteria of molding sand.

4 Discuss the principles and applications of die casting.

5 Describe the function of various casting allowances.

6 Describe the working of the investment casting process.

7 Discuss the common casting defects, their causes, and remedies.

8 Describe the principles of shell molding.

9 Describe the purpose of a gating system and its components.

10 Differentiate between cold chamber and hot chamber die casting.

PART B UNIT II

1 Describe the principles of hot working and its effects on the properties of a metal.

2 Describe the advantages and disadvantages of hot working and cold working.

3 Describe the hot rolling process for producing sheets or plates.

4 Discuss the cold drawing process for manufacturing wires or rods.

5 Describe the various types of extrusion processes.

6 Discuss forging and its different types.

7 Discuss the effects of cold working on the mechanical properties of a material.

8 Describe the working principle of the sheet metal bending process.

9 Discuss the rolling process and its applications.

10 Compare hot working and cold working processes.

PART B UNIT III

1 Discuss the powder metallurgy process with a neat flow chart.

2 Describe the various methods of manufacturing metal powders.

3 Discuss the advantages and limitations of powder metallurgy.

4 Describe the purpose and working of annealing and normalizing processes.

5 Describe the hardening and tempering heat treatment processes.

6 Describe case hardening and its different methods, such as carburizing and nitriding.

7 Discuss the applications of various heat treatment processes.

8 Enumerate the role of a sintering furnace in powder metallurgy.

9 Describe the different types of quenching media.

10 Discuss the T-T-T diagram and its importance in heat treatment.

PART B UNIT IV

1 Describe the construction and working principle of a radial drilling machine.

2 Enumerate the various types of tool materials used in machining with their properties.

3 Describe the different types of drilling operations with neat sketches.

4 Discuss the working of a sensitive drilling machine and its applications.

5 Discuss the properties of cutting fluids and their functions.

6 Discuss the different tool holding devices for drilling machines.

7 Describe the tapping operation and the types of taps used.

8 Discuss the process of boring and the tools used.

9 Discuss the advantages and disadvantages of carbide tools.

10 Write about the feed and speed in a drilling operation.

PART B UNIT V

1 Discuss the working principle of a lathe machine with a neat diagram.

2 Describe the various lathe operations with suitable sketches.

3 Write about the mechanism for taper turning on a lathe.

4 Discuss the different types of lathe chucks and their applications.

5 Describe the working of a lead screw and its importance in thread cutting.

6 Discuss the compound rest method for taper turning.

7 Discuss the various power tools used in manufacturing and their applications.

8 Describe the function of a steady rest and follower rest.

9 Enumerate the procedure for facing a job on a lathe.

10 What is a quick change gear box and how does it work?

EXPLANATORY QUESTIONS 10 marks

PART C UNIT I

1 What is a pattern? Explain the types of patterns used in the foundry.

2 Explain pattern allowances with simple examples.

3 What is moulding sand? Explain its types and properties.

4 Explain the CO2 core making process in simple steps.

5 What are casting defects? Explain any five defects with causes and remedies.

PART C UNIT II

1 What is arc welding? Explain arc welding equipment..

2 Explain MIG welding and TIG welding briefly.

3 What is gas welding? Explain oxy-acetylene welding.

4 Explain the types of flames used in gas welding.

5 What are welding defects? Explain their causes and remedies.

PART C UNIT III

1 What is forging? Explain hot working and its advantages.

2 Explain smith forging, drop forging and press forging.

3 Explain the rolling process with a simple sketch.

4 Explain mechanical press and hydraulic press.

5 Explain press working operations like bending and drawing.

PART C UNIT IV

1 What is powder metallurgy? Explain its basic steps.

2 Explain methods of manufacturing metal powders.

3 Explain the sintering process in powder metallurgy.

4 Explain the Iron–Carbon equilibrium diagram briefly.

5 Explain annealing, normalizing and hardening processes.

PART C UNIT V

1 Explain work holding devices used in the lathe.

2 Explain chucks and centres with their uses.

3 Explain tool holding devices used in machines.

4 What are power tools? Explain any five power tools.

5 Explain hand drill, angle grinder and impact wrench.