

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2022

Duration : 3 Hours
 Course : DPMT
 Subject : Applied Mechanics & Strength of Materials

Max. Marks: 60
 Date : 03.01.2022
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

- 1..Condition of static equilibrium of a planar force system is written as
 A. Sum of all force is equal to zero B. Sum of all moment is equal to zero
 C. A and B D. None of thee
2. According to law of triangle of forces
 A. three forces acting at a point will be in equilibrium
 B. three forces acting at a point can be represented by a triangle, each side being proportional to force
 C. if three forces acting upon a paticle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium
 D. if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two
3. Two coplanar couplers having equal and opposite moments _____?
 A. balance each other B. produce a couple and an unbalanced force
 C. produce a moment of couple D. can not balance each other
4. The ratio of limiting friction and normal reaction is known as _____
 A. coefficient of friction B. angle of friction C. angle of repose D. sliding friction
- 5.Which of the following theories states that "if a body is in equilibrium under the action of three coplanar and concurrent forces, each of the forces is proportional to the sine of the angle between the other two."
 A. Parallelogram Law of Forces B. Lami's Theorem
 C. Triangle Law of Forces D. Polygon Law of Forces
6. A force acting on a body may _____
 A. Introduce internal stresses B. Retard its motion C. Change its motion D. All of the above
7. A force is completely defined when we specify _____
 A. Magnitude B. Direction C. Point of application D. All of the above
8. SI unit of torque is _____
 a. N.m b joule c. both a and b are correct d. neither a nor b is correct
9. The weight of a body is due to
 A. Centripetal force of earth B. Gravitational force of attraction towards the centre of the earth
 C. Forces experienced by body in atmosphere D. Force of attraction experienced by particles
10. M.I. of a triangle of base a and height h, about an axis passing through its c.g. and parallel to the base is given by
 A. $ah^3/8$ B. $ah^3/12$ C. $ah^3/36$ D. $ah^3/24$
11. The S.I. unit of pressure is
 A. Newton metre square B. Newton metre
 C. Newton per metre square or pascal D. Newton per metre
12. The internal resistance force per unit area is called as.....
 A. Stress B. Strain C. Poission's ratio B. Modulus of elasticity
- 13.The modulus of rigidity si unit is.....
 A. Newton B. Second C. Pascal D. Radian
- 14.What is value of Modulus of elasticity for mild steel ?
 A. 100×10^3 MPA B. 180×10^3 MPA C. 120×10^3 MPA D. 210×10^3 MPA
- 15.Generally poission ratio value is
 A. 0 to 1 B. 0 to 0.5 C. -1 to 0.5 D. 1 to 0.5
16. Centre of gravity of a solid cone lies on the axis at the height.....
17. The SI unit of Strain is
18. The opposing force, which acts in the _____ direction of the movement of the block or body, is called force of friction
- 19.Hook's law is valid up to.....

20. The ratio of linear stress to linear strain is known as.....
21. In constitute a couple Two non-collinear parallel equal forces acting in opposite direction (true/false)
22. The C.G. of a semicircle is at a distance of $r/2$ from the centre (true/false)
23. The C.G. of a triangle is at the intersection of its medians (true/false)
24. The coefficient of friction depends on Nature of surface (true/false)
25. The coefficient of friction depends Shape of surfaces (true/false)
26. Expand the following abbreviation FoS.....
27. Expand the following abbreviation Mol.....
28. Expand the following abbreviation BMD.....
29. Expand the following abbreviation SFD.....
30. Expand the following abbreviation C.G.....

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. Define Stress .
2. What is Friction and it's effect ?
3. Define Static equilibrium.
4. What is Bending Moment Diagram ?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

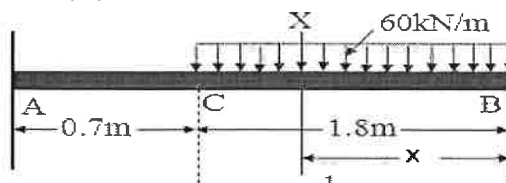
1. What are the Laws of Friction?
2. Define type of Support and name it.
3. A 400-gram package lying on a horizontal surface is attached to a horizontal string which passes over a smooth pulley. When a mass of 200 grams is attached to the other end of the string, the package is on the point of moving. , the coefficient of friction. μ Find
4. Explain Centre of gravity with example
5. Explain Moment of Inertia Formula

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1 A cantilever beam carries a uniform distributed load of 60 kN/m as shown in figure. Draw the shear force and bending moment diagrams for the beam



2. Define Parallel Axis Theorem.
3. If the moment of inertia of a body along a perpendicular axis passing through its centre of gravity is 50 kg·m² and the mass of the body is 30 Kg. What is the moment of inertia of that body along another axis which is 50 cm away from the current axis and parallel to it? Use Parallel Axis Theorem Formula

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2022

Duration : 3 Hours
 Course : DPMT
 Subject : Engineering Metrology

Max. Marks: 60
 Date : 04.01.2022
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

1. _____ is the science of precision measurement of quantities which can be expressed in terms of linear or angular units.
2. _____ is the range of value within which the trial values of measured lies..
 a) Sensitivity b) Uncertainty c) Quantities d) Readability
3. The degree of closeness of the measured value of a certain quantity with its true value is known as _____.
 a) Accuracy b) Precision c) Sensitivity d) Standard
4. Spirit levels are used for measuring _____.
5. The part of a micrometer on which millimeter scale is marked is called _____.
 a) Barrel b) Thimble c) Anvil d) Ratchet
6. L.M.C stands for _____.
7. HRC Stands for _____.
8. The least count of Outside micrometer is _____.
9. Telescope gauge is used to measure the pitch of thread-True or False.
10. ISO stands for _____.
11. The depth of cavity is measured by depth micrometer- True or False.
12. 0.25mm is equal to _____ micron.
13. Reed comparator is a _____ comparator.
14. M.M.C stands for _____.
15. The _____ standard used to measure the distance between two flat parallel faces.
 a) Line Measurement b) End Measurement
 c) Both a & b d) None of these
16. External taper can be measured accurately with the help of _____.
 a) Sine bar and height Guage b) Sine bar and Slip Guage
 c) Ring Guage d) all of the above
17. The temperature may affect the surface texture – True or False.
18. Which of these is not a type of micrometer ?
 a) Inside b) Depth c) Outside d) Height
19. The difference between upper limit and lower limit is called _____.
 a) fit b) tolerance c) clearance d) none of these
20. Which of the following is an angle measuring device _____.
 a) Slip gauge b) Trammel
 c) Sine bar d) Hermaphrodite caliper
21. The Vernier caliper is used for measuring of _____.
 a) Outside b) Inside c) Depth d) all of the above
22. In the Shaft basis system _____.
 a) Size of hole is kept as a constant b) Size of shaft is kept as a constant
 c) Size of hole and shaft both may vary d) none of these
23. The stylus used to measure the roughness is a made of _____.
 a) Graphite b) Diamond c) H.S.S d) Cast Iron
24. Which of the following is a line standard of measurement ?
 a) Micrometer b) slip gauges c) Measuring tape d) all of the above
25. Optical gauge works on the principle of _____.
 a) Reflection b) Refraction
 c) Interference of light rays d) Polarization
26. A clinometers is used for _____.
 a) Roundness measurement b) Flatness Measurement
 c) Angular measurement d) None the above

27. Taylor's principle is concerned with
a) Pneumatic comparators b) gauging instruments
c) Clinometers d) none of these
28. C.L.A. system more popular than System.
a) R.M.S b) Ra
c) Both a & b d) None of these
29. GD & T stands for _____.
30. Screw pitch gauge is used for measuring (or) checking the pitch of internal threaded component only – True or False.

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. Define the Line standard measurements and End standard measurements.
2. Define the terms Fit and their types.
3. Define micrometer
4. Define Go gauge & NO GO gauge.

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. Define the terms calibration and its important role in manufacturing sector.
2. Explain Metrology and their objectives.
3. Explain the working principle of Clinometers.
4. Write the name of Geometric characteristics with symbol and category.
5. Why surface is more important in mold manufacturing and which types of changes may occurred due to thermal energy?

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Explain the working principle of Vernier Calliper with a neat sketch.
2. Explain briefly working principle of vernier height gauge.
3. Explain the working principle of Sine bar and their advantages & limitations.

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2022

Duration : 3 Hours
 Course : DPMT
 Subject : Machine Shop Technology-I

Max. Marks: 60
 Date : 05.01.2022
 Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

1. Which cutting condition affects the cutting temperature predominantly?
 a) Depth of cut b) cutting speed c) Feed d) None of the above
2. The cutting tool removes the metal from work piece in the form of _____
 a) Solid Blocks b) Powder c) Chips d) All of the above
3. Tool life is calculated by _____ formula
 a) $L = 1000 \text{ ts VT mm}^3/\text{min}$ b) $L = 100 \text{ ts VT mm}^3/\text{min}$
 c) $L = 30 \text{ ts VT mm}^3/\text{min}$ d) $L = 60 \text{ ts VT mm}^3/\text{min}$
4. _____ is the time a tool can be reliably be used for cutting before it must be discarded/ repaired
 a) Tool life b) Tool time c) Tool loss d) None
5. The cutting speed of high speed steels is 04 times faster than carbon steel –say true or false
6. Which type of chips form while machining of brittle materials Cutting speed
 a) Continuous chips b) Discontinuous chips c) Built-up chips d) All of the above
7. _____ control , both direction of chip flow and the strength of the tool lip
 a) Side rake angle b) Relief angle c) Rake angle d) All of the above
8. Functions of cutting fluids are
 a) To cool the cutting tool and the work piece
 b) To lubricate the chip, tool and work piece
 c) To help carry away the chips
 d) All of the above
9. Which machine tool is known as the mother machine tool?
 a) Drilling machine b) Milling machine
 c) Lathe Machine d) None of the above
10. In lathe work, when the tool is feed parallel to the rotation of job work, it will produce
 a) Cylindrical surface
 b) Spherical surface
 c) Tapered surface
 d) All of the above
11. The cutting fluids mostly used for machining alloy steel is
 a) Water b) Soluble oil c) Dry d) Sulphurised mineral oil
12. A reamer is used as both a hand & machine tool - say true or false
13. 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
14. The relation of the cutting speed to the tool life is expressed by the
 a) $VT=C$ b) $VT^n=C$ c) $V^nT=C$ d) None of the above
15. Engine lathe is also called as _____
 a) Centre lathe b) bench lathe c) Speed lathe d) Automatic Lathe
16. The Unit of Cutting Speed is _____
 a) Metre/min b) Metre seconds c) RPM d) All of the above
17. In Lathe the height of the centres measured from the _____
 a) Lathe bed b) Lathe Gear box c) Lathe chuck d) All of the above
18. The following is also known as tool rest
 a) Saddle b) Cross slide c) Compound rest d) Tool post
19. A desired speed of _____ can be obtained by selecting the suitable change gears having proper number of teeth
 a) Lead screw b) Counter shaft c) Spindle d) all of the above

20. The following is used for holding bored parts for machining their outside surface on lathe
a) Mandrel b) Dogs c) Driving plate d) Angle plate
21. Which of the following options best describes the centre lathe?
a) Machining machines b) Shaping machines c) Turning machines d) None of the above
22. The operation mainly done on a shaping machine is Machining a flat surface- say true or false
23. In geared shaper, reciprocating motion of the ram is obtained by____
a. Hydraulic power b. Rack and Pinion c. Pneumatic d. All
24. The ratio of forward stroke time to return stroke time is
a). 3 : 1 b). 5 : 3 c). 1 : 2 d) 3 : 2
25. Quick Return mechanism is used in
a) Shaper b) Lathe c) Drilling d) Grinding
26. Compared to forward stroke the return stroke in shaper is Faster – say true or false
27. Goose neck tool is used in _____ machines.
a. Shaper b. Planer c. Both a & b d. None
28. _____ is an operation of making a circular hole by removing a volume of metal from the job by a cutting tool.
a. Reaming b. Boring c. Drilling d. Turning
29. The flutes in drill _____
a. Allow the chips to escape from the hole b. Admit cutting fluid
c. Form the cutting edges d. All of the above
30. The included lip angle of drill is 118° - say true or false

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

1. How do you specify the lathe machine?
2. Differentiate between single point and multi point cutting tool
3. Which operation of enlarging a hole through certain distance from one end instead of enlarging the whole drilled surface?
4. What type of mechanism is used for giving reciprocating motion to the ram shaper and how it can be classified ?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. Explain about the different types of Chip formation?
2. Define feed, speed and depth of cut in lathe machine
3. How to perform taper turning operation in lathe with neat diagram?
4. Define about Planner & its operations with a neat diagram.
5. write down different operations which can be performed in drilling machine with neat diagram

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Explain lathe machine working principle with neat sketch
2. Describe about the different types of mechanisms performed in shaping machine with suitable Figure?
3. Explain drill nomenclature with neat sketch

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2022

Duration : 3 Hours
Course : DPMT
Subject : Engineering Drawing

Max. Marks: 60
Date : 06.01.2022
Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

- Which of the following is not used for fixing the drawing on the board -
(a) Drawing pins (b) Adhesive tapes (c) Threads (d) Clips
- Which of the following is the lightest pencil?
(a) 2B (b) 1B (c) HB (d) H
- As per the BIS code of specification, maximum width of the title block will be
(a) 190 mm (b) 180 mm (c) 175 mm (d) 170 mm
- Principal methods of development of surfaces are -
(a) Parallel line development (b) Radial line development
(c) Triangulation development (d) all of the above
- The size of the title block is _____ mm x _____ mm.
a) 25 x 10 (b) 100 x 25 (c) 60 x 185 (d) 185 x 65
- Which is not the use of divider?
a) To divide curved or straight lines into the desired number of equal parts
b) To draw circles
c) To transfer dimensions from one part of the drawing to another part
d) To set-off given distances from the scale to the drawing
- Which of the following lines are used to show that the object is cut and then viewed?
(a) Hidden lines (b) Leader lines (c) Centerlines (d) Hatching Lines
- Representative fraction is the _____
(a) The ratio of the length in drawing to the actual length
(b) The ratio of the actual length to the length in the drawing
(c) Reciprocal of the actual length
(d) Square of the length in the drawing
- What is the type of scale in which the representative fraction is 1:1?
(a) Enlarged scale (b) Reduced scale (c) Full-size scale (d) Graphical scale
- In first angle projection method, the relative positions of the object, plane and observers are
(a) Object is placed in between (b) Plane is placed in between
(c) Observer is placed in between (d) none of these
- A point is 20 mm above H.P. and 30 mm in front of V.P. Its top view is
(a) 20 mm below xy (b) 30 mm below xy (c) 20 mm above xy (d) 30 mm above xy
- In perspective projection, picture plane is located _____
(a) Between the station point and the object (b) Before the station point and the object
(c) After the station point and the object (d) All the above
- Which bolt is used for lifting heavy machines?
(a) Hook bolt (b) T-headed bolt (c) Lifting eye bolt (d) Square headed bolt
- The designation of sheet of size 594 x 841 is
(a) A0 (b) A1 (c) A2 (d) A3
- Plumber Block is an example of -
(a) Journal bearing (b) Pivot Bearing (c) Collar bearing (d) None of these
- _____ drawing is prepared for the installation or erection of a machine
- It is customary for the first sheet of a working drawing set to include _____.
- In perspective projection, the centre of vision is the point in which the perpendicular axis pierces the _____.
- If the slant height and base circle radius of the cone are 20 cm and 10 cm respectively. The radius of the development of the curved surface of a cone will be _____.
- _____ type of solid has two bases that are parallel equal polygons.

21. The accuracy of the drawing depends on the quality of the instruments used. True/False
22. 1:10000 is enlarging scale. True/False
23. The perspective will remain same even if the station point changes. True/False
24. A joint is said to be double-riveted, triple riveted etc. accordingly to the number of row of rivet used. True/False
25. In 1st angle projection the left side view will be left side of front view. True/False
26. BOM stands for
27. ASME stands for
28. R.F full form
29. ANSI stands for
30. ASSY stands for

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

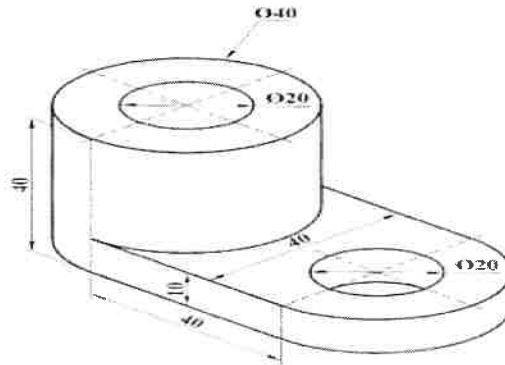
1. Define Representative fraction in scales.
2. Define orthographic projections.
3. What is coupling?
4. Why the Projections of objects not drawn in Second and Fourth Angle of Projections?

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

1. The top view of a 75 mm long line AB measures 65 mm, while the length of its F.V. is 50 mm. Its one end A is in the H.P. and 12 mm in front of V.P. Draw the projections of line AB.
2. Make a complete orthographic drawing (with necessary number of projections) of given model and dimension it.



3. Explain the need of assembly drawing and its importance.
4. What are the different type of coupling used in assembly? Discuss it.
5. Show the symbolic representation of fasteners used in drawing.

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

1. Draw the three views of a cube 30 mm side when it is resting on its base on HP with one of the base edges making an angle of 45° to the VP.
2. A pentagon prism of 25 mm base edges and 50 mm long, resting on its base with an edge of base at 45° to the VP. The prism is cut by a section plane V.T. inclined at 30° to the HP and passes through a point 25 mm from the base along its axis. Develop its lateral surface of the truncated prism.
3. Construct a Diagonal scale of 4 meters length (RF=1/5) and show length 2.69 meter.

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
HEAD OFFICE : GUINDY, CHENNAI – 600 032.
ACADEMIC CELL
THIRD SEMESTER EXAMINATION – JANUARY - 2022

Duration : 3 Hours
Course : DPMT
Subject : Plastics Materials & Testing

Max. Marks: 60
Date : 07.01.2022
Time : 10.00 a.m. to 01.00 p.m.

(DO NOT CHANGE SEQUENCE OF QUESTION NUMBER IN ANSWER SCRIPT)

PART – A

Answer **all** questions

30 x 1 = 30

- Glass transition temperature (T_g) of Nylon 6 is _____
a) 100°C b) 223°C c) 264°C d) 50°C
- Styrene butadiene rubber is an example for _____
(a) Alternating copolymer (b) graft copolymer (c) random copolymer (d) block copolymer
- A transparent polymer is mostly _____
(a) Amorphous (b) Crystalline (c) Semi-crystalline (d) none of the above
- The temperature and relative humidity for conditioning of test specimens is _____
(a) $23\pm 5^\circ\text{C}$, $60\pm 5\%$ RH (b) $23\pm 2^\circ\text{C}$, $50\pm 5\%$ RH
(c) $28\pm 5^\circ\text{C}$, $50\pm 5\%$ RH (d) $30\pm 2^\circ\text{C}$, $50\pm 5\%$ RH
- Conditioning of test specimen is carried out as per ASTM D
(a) 608 (b) 618 (c) 638 (d) 648
- Which of the following material is Notch sensitive
a) ABS b) Polycarbonate c) PP d) PET
- Which of the following plastics material has highest Density?
a) POM b) Polycarbonate c) PET d) PTFE
- Which of the following plastics material is amorphous in nature?
a) PTFE b) Polycarbonate c) PET d) PBT
- Which of the following plastics is used for coating Cookware?
a) PTFE b) PPO c) PVF d) PC
- The tensile specimen can be cut from a sheet using _____
(a) Contour cutting / punching (b) Injection moulding
(c) Compression moulding (d) none of these
- Which of the following is a self-extinguishing plastic material?
(a) PET (b) PBT (c) PC (d) PP
- Which of the following material is used for manufacturing of Foam.
a) PBT b) Nylon 6 c) PTFE d) Polyurethane
- The ASTM standard for Melt flow index test is.
(a) ASTM D 1238 (b) ASTM D 256 (c) ASTM D 648 (d) None of these
- The ratio of stress to strain in the proportional limit is called _____
(a) Elastic limit (b) Yield point (c) Modulus of Elasticity (d) Ultimate Strength
- Gradual increase in strain with respect to time under constant stress is called _____
(a) Creep (b) Fatigue (c) Strain relaxation (d) Stress relaxation
- In general, strongest polymer group is _____
a. Thermoplastic b. Thermoset c. Elastomer d. All of these
- Rayon is made from _____
a. Nylon b. Polyester c. Cellulose d. All of these
- Kevlar is commercial name of _____
(a) Glass fibers b. Carbon fibers c. Aramid fiber d. Cement
- _____ is a rigid, transparent, high impact strength material.
a) PET b) PC c) PA 6 d) PPO
- _____ Hardness tester is used for reinforced plastics and unreinforced rigid plastics.
(a) Rockwell (b) Barcol (c) Durometer (d) UTM
- Teflon is commercial name for PTFE material. True or False?
- Melting point of PEEK is 243°C . True or False?
- Shellac originates from insects. True or False?
- Density of LLDPE is $0.910\text{--}0.925\text{ g/cc}$. True or False?
- Ziegler Natta Catalyst is used for manufacturing of ABS. True or False?
- 26.

- 27. PET stands for _____.
- 28. TGA stands for _____.
- 29. ABS stands for _____.
- 30. SAN stands for _____.
- 31. HDT stands for _____.

PART – B

Answer **all** questions (Max. 40 words)

4 x 2 = 8

- 1. Draw recycling symbol of HDPE and PET.
- 2. Give few applications of Polystyrene.
- 3. What are the different types of polymerisation?
- 4. Give some examples of tough & soft plastics materials.

PART – C

Answer any **four** questions (Max. 100 words)

4 x 3 = 12

- 1. Write short notes on LCP.
- 2. What are the main differences between Organic and Inorganic polymers? Explain with examples.
- 3. What is Pre-conditioning? Why do we do it prior to Testing?
- 4. What is Glass Transition Temperature (T_g) and Flow Temperature (T_f)?
- 5. Write short notes on
 - a. MFI
 - b. Volume resistivity
 - c. Refractive Index

PART – D

Answer any **two** questions (Max. 300 words)

2 x 5 = 10

- 1. Discuss the properties and applications of Polyphenylene Oxide and Nylon 6.
- 2. Write down the structure, properties and applications of Polypropylene (PP).
- 3. Explain the basic concepts of impact strength and explain the factors affecting the properties of Izod impact strength.
