

## 9. CONVENTIONAL REPRESENTATION OF COMMON FEATURES AND MATERIALS

a. Common features. Conventional representation is adopted in cases where complete delineation of the part would involve unnecessary drawing-time or space. Typical

examples are shown in Figs. 30 to 35. Where the conventional representation given is not considered adequate, a more detailed view may be shown.

TITLE	SUBJECT	CONVENTION
EXTERNAL SCREW THREADS (DETAIL)		 Preferred
INTERNAL SCREW THREADS (DETAIL)		 Preferred
SCREW THREADS (ASSEMBLY)		 Preferred  When this convention is used externally threaded parts are shown covering internally threaded parts.
COMPRESSION SPRINGS		   Schematic
TENSION SPRINGS		   Schematic
SPLINED SHAFTS		
SERRATED SHAFTS		

Fig. 30. Conventional representation of common features

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## CLAUSE 9 (contd.)

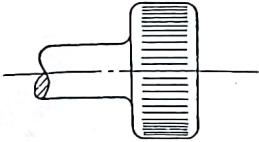
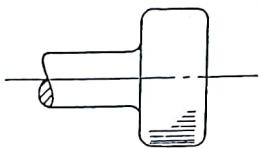
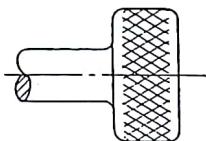
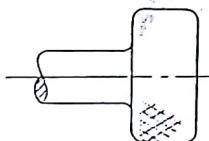
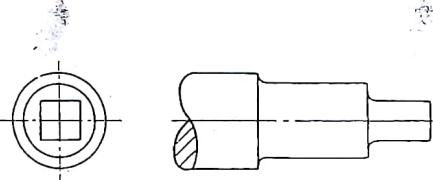
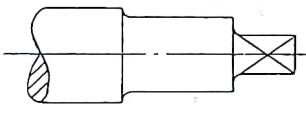
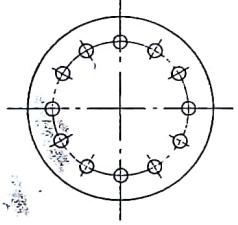
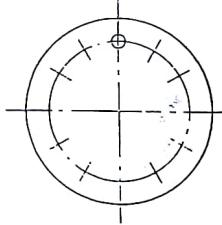
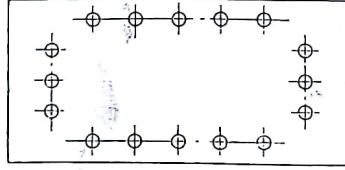
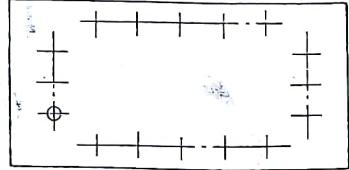
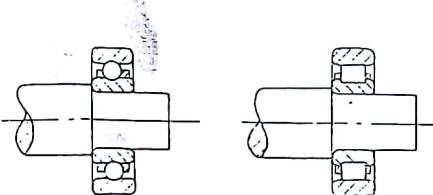
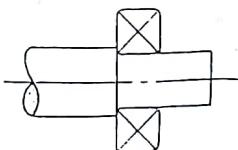
TITLE	SUBJECT	CONVENTION
STRAIGHT KNURLING.		
DIAMOND KNURLING.		
SQUARE ON SHAFT.		
HOLES ON CIRCULAR PITCH.		
HOLES ON LINEAR PITCH.		
BEARINGS.		

Fig. 31. Conventional representation of common features

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## CLAUSE 9 (contd.)

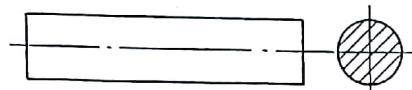
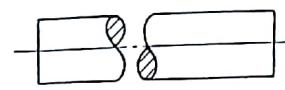
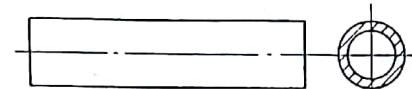
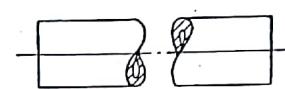
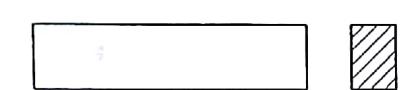
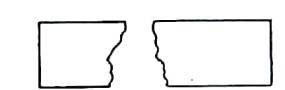
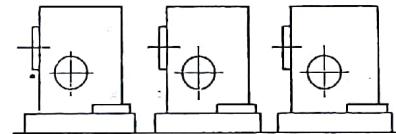
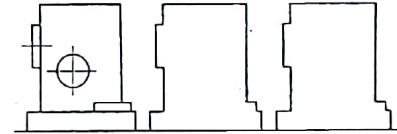
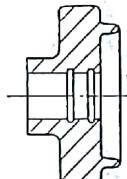
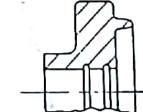
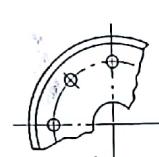
TITLE	SUBJECT	CONVENTION
	 Round (solid)	
BREAK LINES	 Round (tubular)	
	 Rectangular	
REPEATED PARTS		
TREATMENT OF SYMMETRICAL PARTS	 	 

Fig. 32. Conventional representation of common features

## CLAUSE 9 (contd.)

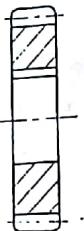
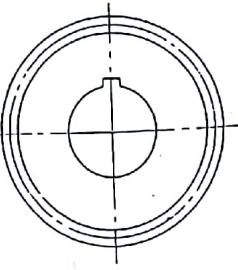
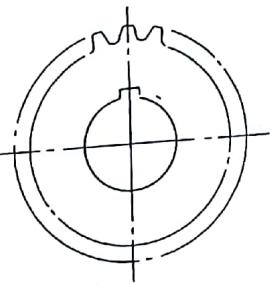
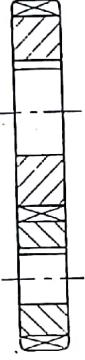
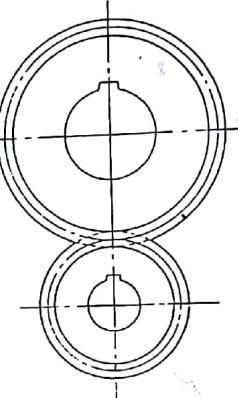
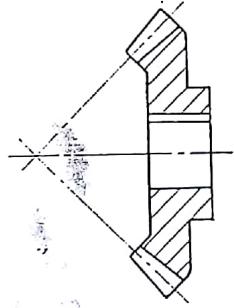
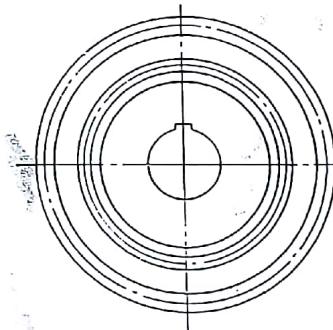
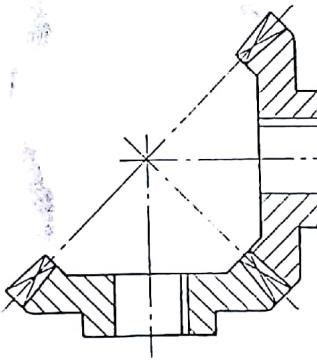
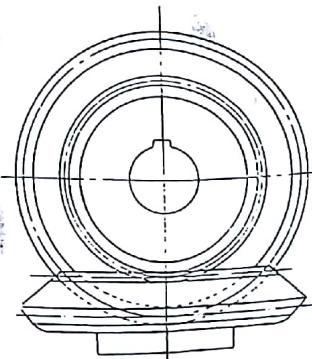
TITLE		CONVENTION
SPUR GEAR (DETAIL.)		  Alternative
SPUR GEARS (ASSEMBLY.)		
BEVEL GEAR (DETAIL.)		
BEVEL GEARS (ASSEMBLY.)		

Fig. 33. Conventional representation of common features

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## CLAUSE 9 (contd.)

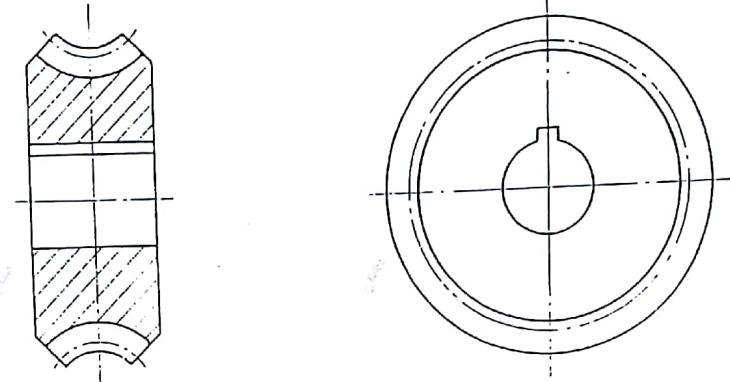
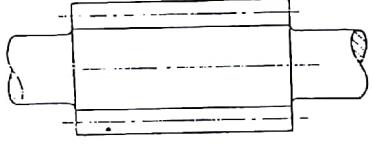
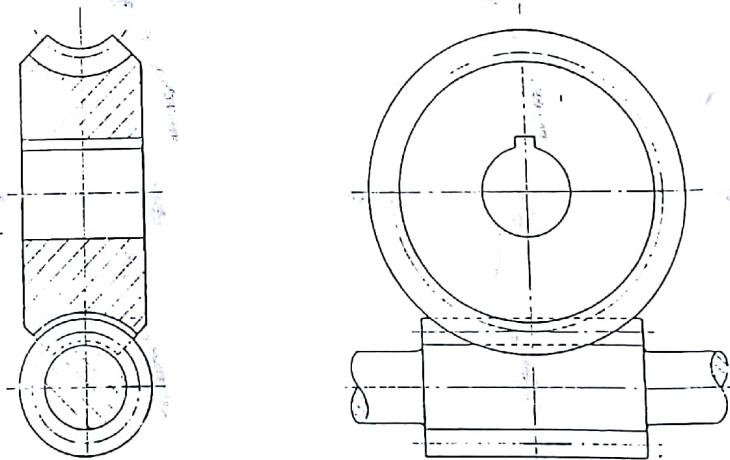
TITLE	CONVENTION
WORMWHEEL (DETAIL)	
WORM (DETAIL)	
WORM AND WORMWHEEL (ASSEMBLY)	

Fig. 34. Conventional representation of common features

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## CLAUSE 9 (contd.)

TITLE	CONVENTION
INSULATION	
GLASS	
WOOD	
CONCRETE	
WATER	

Fig. 35. Conventional representation of materials

b. Materials. (i) *Section lining*. In view of the variety of materials used it is undesirable to rely on the various conventions of section lining to differentiate between different materials.

It is therefore recommended that, with the exception of insulation, glass, wood, concrete and water, ordinary section lining be used in all cases where materials are shown in section.

Fig. 35 illustrates recommended methods of showing insulation, glass, wood, concrete and water.

(ii) *Colouring*. Where it is desired to indicate materials by colours, the following are recommended:

Material	Colour
Cast iron	Payne's grey
Wrought iron	Prussian blue
Steel	Purple
Brass, phosphor bronze and gunmetal	Light yellow
Copper	Crimson lake
Aluminium, tin, white metals and light alloys	Light green
Brickwork	Vermilion
Concrete	Light green
Earth, rock	Sepia
Timber	Burnt sienna
Glass	Pale blue wash
Insulation (electrical)	Black

## 10. ABBREVIATIONS FOR USE ON DRAWINGS

The following abbreviations should be used on drawings when required. Abbreviations are the same in the singular and plural. Although capital letters are shown, lower-case letters may be used where appropriate. Full stops are not used except when the abbreviation makes a word, e.g. the abbreviation for the word 'figure'.

Further recognized abbreviations are listed in other British Standards.

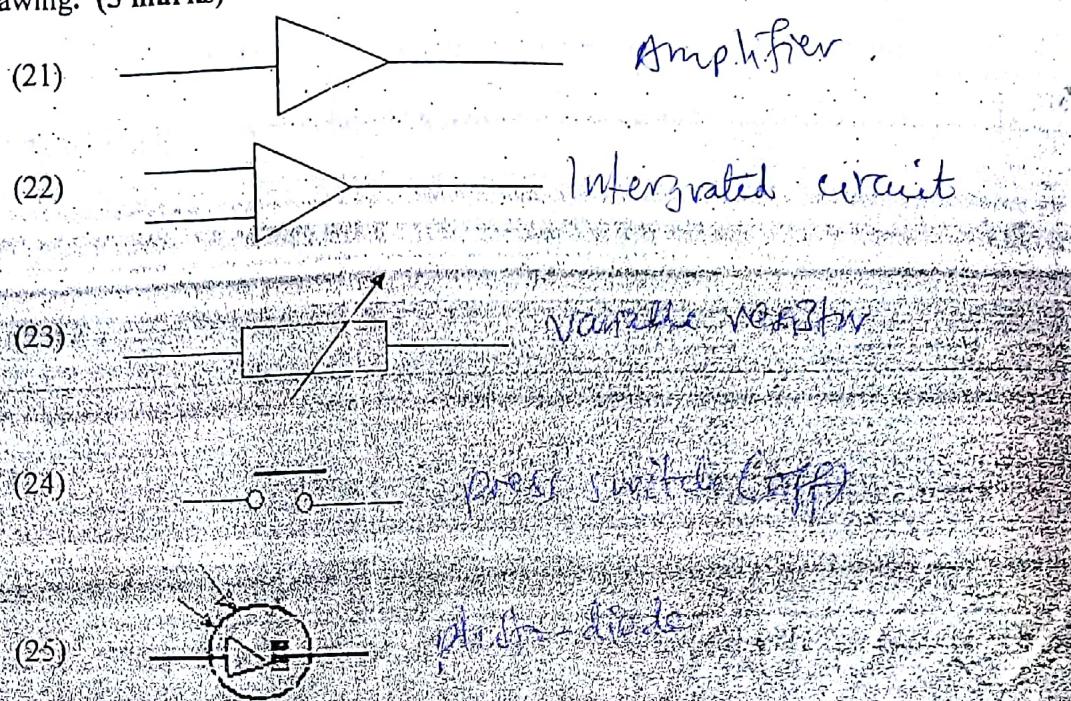
### GENERAL ENGINEERING TERMS

Term	Abbreviation	Term	Abbreviation
Across flats . . . . .	A/F	Not to scale . . . . .	NTS
Assembly . . . . .	ASSY	Number . . . . .	NO.
Birmingham gauge . . . . .	BG	Outside diameter . . . . .	O/D
British Standard . . . . .	BS	Pattern number . . . . .	PATT NO.
Centimetre . . . . .	CM	Pitch circle diameter . . . . .	PCD
Centres . . . . .	CRS	Pneumatic . . . . .	PNEU
Centre line . . . . .	CL or £	Pound . . . . .	LB
Chamfered . . . . .	CHAM	Radius . . . . .	RAD or R
Cheese head . . . . .	CH HD	Required . . . . .	REQD
Countersunk . . . . .	CSK	Revolutions per minute . . . . .	RPM
Countersunk head . . . . .	CSK HD	Right hand . . . . .	RH
Counterbore . . . . .	C'BORE	Round head . . . . .	RD HD
Cylinder or cylindrical . . . . .	CYL	Screw threads	
Datum system . . . . .	DATUM	British Association . . . . .	See relevant B.S.
Degree (of angle) . . . . .	DIA or $\phi$	British Standard Whitworth . . . . .	(Note. Where desired for clarity on drawings the designation may be amplified, e.g. BS FINE for BSF and BS PIPE PARALLEL for BSP P1.)
Diameter . . . . .	DRG	British Standard fine . . . . .	
Drawing . . . . .	FIG.	British Standard pipe taper . . . . .	
Figure . . . . .	FT (or F)	British Standard pipe parallel . . . . .	
Fdot . . . . .	GAL	British Standard pipe longscrew . . . . .	
Gallon . . . . .	GALV	British Standard pipe fastening . . . . .	
Galvanized . . . . .	HB	British Standard cycle . . . . .	See relevant B.S.
Hardness—Brinell . . . . .		Système International . . . . .	
Rockwell . . . . .		British Standard conduit . . . . .	See relevant B.S.
A scale . . . . .	HRA	Unified threads . . . . .	
B scale . . . . .	HRB	Screwed . . . . .	SCR
C scale . . . . .	HRC	Second (of angle) . . . . .	"
D scale . . . . .	HRD	Sheet, when preceding a material . . . . .	SH
E scale . . . . .	HRE	Sketch . . . . .	SK
Vickers . . . . .	HV	Specification . . . . .	SPEC
Hexagon . . . . .	HEX	Spherical . . . . .	SPH
Hexagon head . . . . .	HEX HD	Spotface . . . . .	S'FACE
Hydraulic . . . . .	HYD	Square . . . . .	SQ
Inch . . . . .	IN (or ")	Square inch . . . . .	SQ IN
Insulated or insulation . . . . .	INSUL	Standard . . . . .	STD
Internal diameter . . . . .	I/D	Standard (imperial) wire gauge . . . . .	SWG
Kilogram . . . . .	KG	Threads per inch . . . . .	TPI
Left hand . . . . .	LH	Undercut . . . . .	UCUT
Long . . . . .	LG	Volume . . . . .	VOL
Machine . . . . .	M/C	Weight . . . . .	WT
Machined . . . . .	M/CD		
Material . . . . .	MATL		
Maximum . . . . .	MAX		
Metre . . . . .	M		
Millimetre . . . . .	MM		
Minimum . . . . .	MIN		
Minute (of angle) . . . . .			

### TERMS RELATING TO DIMENSIONS AND TOLERANCES

Term	Abbreviation	Term	Abbreviation
Basic dimension . . . . .	BASIC	Flatness tolerance . . . . .	FLAT TOL
Datum . . . . .	DATUM	Parallelism tolerance . . . . .	PAR TOL
Datum system } . . . . .		Positional tolerance . . . . .	POSN TOL
Datum dimension } . . . . .		Roundness tolerance . . . . .	RD TOL
True position, or true profile, dimension in conjunction with positional, or profile tolerances . . . . .	TP	Straightness tolerance . . . . .	STR TOL
Angularity tolerance . . . . .	ANG TOL	Squareness tolerance . . . . .	SQ TOL
Concentricity tolerance . . . . .	CONC TOL	Symmetry tolerance . . . . .	SYM TOL
Cylindricity tolerance . . . . .	CYL TOL	Tolerance zone (profiles) . . . . .	TOL ZONE

- (j) Write the meanings of the following Electrical/Electronics symbols as applied in engineering drawing. (5 marks)



- (i) At what angle are hatching/sectioning lines in sectioned views drawn? (1 marks)

## SECTION B (60 marks)

2. (a) Briefly explain what Assembly Drawing is.  
(b) Mention three types of Assembly Drawing  
(c) Do either (i) or (ii)
  - (i) Using Installation assembly drawing, assemble the following item: (label the items) System set (Computer/PC), Monitor, Key board, Mouse, UPS, Printer, Scanner and Extension cable.
  - (ii) Using Installation assembly drawing, draw the transmission system of a car comprising of engine, clutch, gear box, propeller shaft, 2 universal joints, differential, 2 real axles, 2 real wheels. (20 marks)
3. (a) Figure 26 shows a machine component to be manufactured. Briefly explain the meaning of each symbol /term. (20 marks)

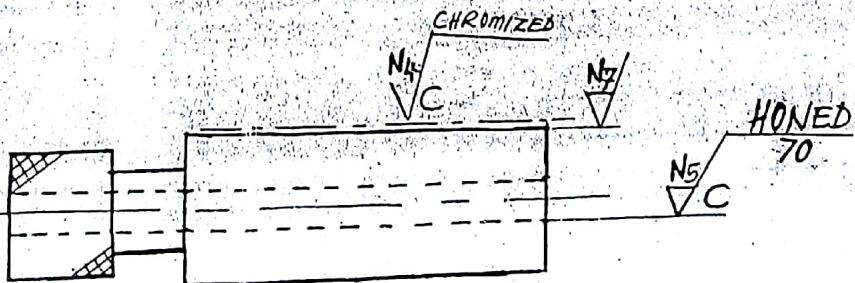


Figure 26

(d) In a scaled drawing, an enlarged scale is indicated by: ( 2 marks)

- (A) 1:4    (B) 1:5    (C) 1:2    (D) 2:1

(e) Briefly explain what a detail drawing is. ( 4 marks)

(f) Explain for what does the following abbreviations stand for ( 5 marks)

- (i) SPEC    (ii) SK    (iii) CHAM    (iv) PCD    (v) HYD

(g) Give the names of the screw heads shown by figures 13, 14, 15, 16 and 17 below. ( 5 marks)



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17

(h) Figures 18, 19 and 20 show different machining operations, write the name of operation to each Figure. ( 6 marks)

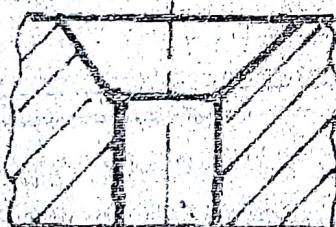


Figure 18

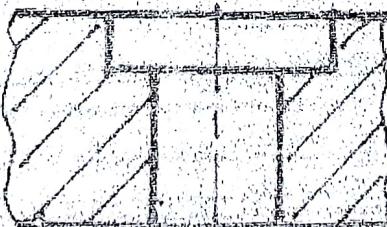


Figure 19

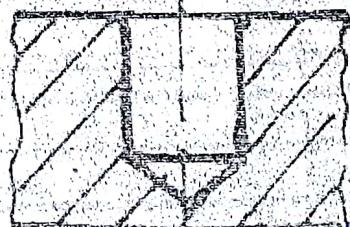


Figure 20