

# KWA TRACER OVERSEER GRADE 3

## TENTATIVE SYLLABUS

- » W/S Calculation and Science (Mechanical)- Units – British, MKS, SI Units – and their conversions – Length, Area, Volume, Mass and Time – Definition of Mass, Weight, Density, Specific Gravity – Determination of Sides and area of triangles, polygons, Circles, segment and sections – surface area and volume of cubes, cylinder, prism, pyramid, cone, sphere – Simpson's Rule – Application – Area of the ellipse – Simple Problems.
- » Machine Tools – Safety precautions – the study of parts, working, different operation, and of lathes – milling machine – shaping machine – slotting machine – planning machine – various attachments – quick return mechanisms.
- » Internal Combustion Engines – Engine Parts – two-stroke and four-stroke engines – petrol and diesel engines – components like the carburetor, fuel injector, fuel pump, etc. Bearing materials – bearing classifications – frictional and anti frictional bearings – advantages and applications
- » Belt, Gear, and Chain Drives – belt materials – types of material – specifications and number coding belt power – belt speed – slip and creep – velocity ratio – pulley ratio – V belt – number of belts for power transmission – gear materials – types of gear drives – velocity ratio – nomenclature of gears –types of gears and application – classification of chain drive – power transmission – positive drive. Cams – types of cams – the function of cams – industrial application – types of followers – kinds of motion – displacement diagrams – terms used.
- » Machine Drawing -Screw threads – nomenclature of screw threads – nuts, bolts, and washers – BIS conventions – cotter and pin joints – riveted joints – welded joints, pulleys, bearings, machine parts, engine parts, valves cam and followers, jig and fixtures. Couplings, pipe joints, and pipe layouts, Surface Texture – Limits, fits, and tolerances.
- » Geometrical Drawing and Engineering Graphics: Graphic Language – drawing instruments – types of lines –method of lettering – Dimensioning – principles of representation and construction of different types of scales – Recommended scales for drawing with reference to BIS Codes – Construction of Plain Geometrical figures – Construction of conic sections – ellipse, parabola, and hyperbola – Miscellaneous curves – involute, cycloid, helix and spiral – theory of projections – types of projections – classification of planes – first angle & third angle projections – the projection of points – Lines and Planes – the projection of Lamina, Solids – True shapes – section of solids – Intersection of surfaces – developments of surfaces – orthographic projection – Oblique projection – Isometric projection – perspective projection

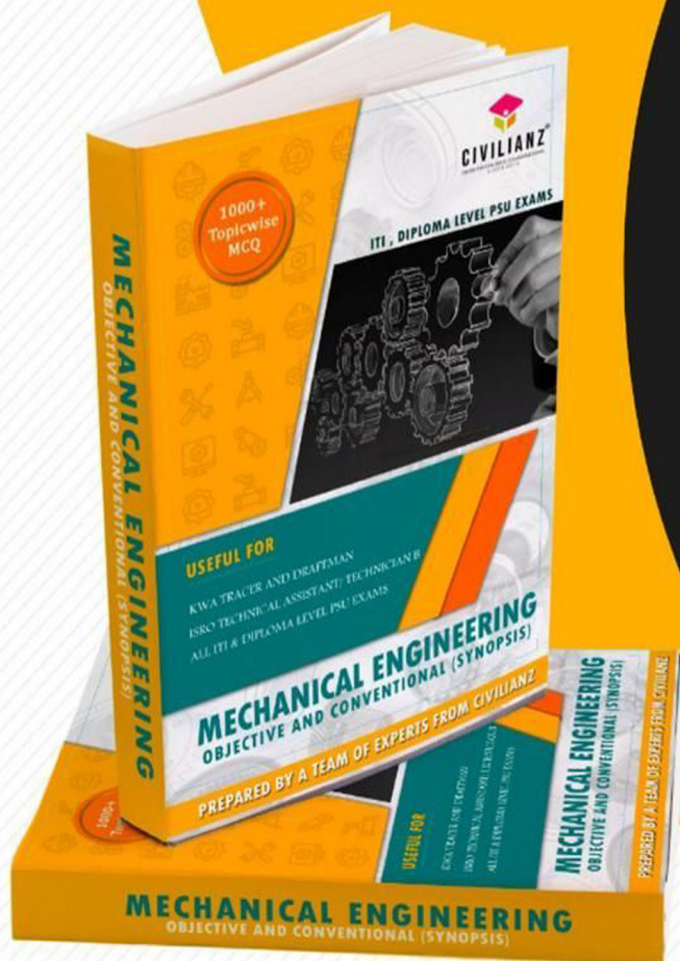
- » Practice on Computer and Computer Application:- General terms used in Computer, Elementary DOS Commands, Windows commands and their uses, MS Word and MS Office, AutoCAD Introduction, Various AutoCAD commands, use of different terms of AutoCAD, function keys and shortcut keys, knowledge about 2D and 3D modeling, solid primitives, viewpoint, extrude and subtract command, union, Drawing with layers and blocks. Knowledge of layout and printing drawing.
- » Building Construction – Glossary of terms of building construction and building materials. Names of different parts of the building. Bricks masonry – principles of construction of bonds – English Bond, Flemish Bond, T Joints, Wall Junctions. R.C.C. – Introduction, uses, materials, proportions, and formwork including bending of bars and construction reference of BIS Code. Reinforced brickwork. Materials used for RCC, selection of materials, coarse aggregate, fine aggregate, cement- water, reinforcement, characteristics. Method of mixing concrete-hand mixing and machine mixing, Slump test.
- » Arches: technical terms, forms-bricks, and stone, lintel. Bracket, centering, forms, and sizes.
- » Door: Parts of the door, Location, sizes, and types of Windows and Ventilators – including steel window & ventilators – fixtures and fastenings used indoors, windows, and ventilators.
- » Roof: Pitched roof types, roof covering, component parts of the roof. Theory of trussing, king, and queen post trusses.
- » Estimating and Costing – for simple building, the specification for different works
- » Road, Irrigation – Introduction to roads, general principles of alignment. Classification and construction of different types of roads. Glossary terms of roads, culvert, irrigation
- » W/S Calculation and Science (Civil) – Centre of Gravity, Hooks Law, Ultimate stress and Breaking stress, Moment and Moment of Inertia for different sections, Various types of load and supports, Bending moment, shearing force, Cantilever & Simply supported beams. Bending stress.
- » Surveying
- » Chain Surveying – Principles – instruments employed, used, care & maintenance. Field Problems. Field book plotting. Plane table survey – Instruments employed, use, care & maintenance. Prismatic Compass. Planimeter and Pentagraph. Leveling – Instruments and accessories – their uses and description – level book. Differential leveling. Application of chain and leveling to construction. Plotting, preparation of contour, computing earthwork by spot level, and contours. Setting out work.
- » Planimeter –enlarging and reducing of plans, use of proportions, compass and pantographs and their parts
- » Curves – Simple curves, Compound curves, transition curves, vertical curves

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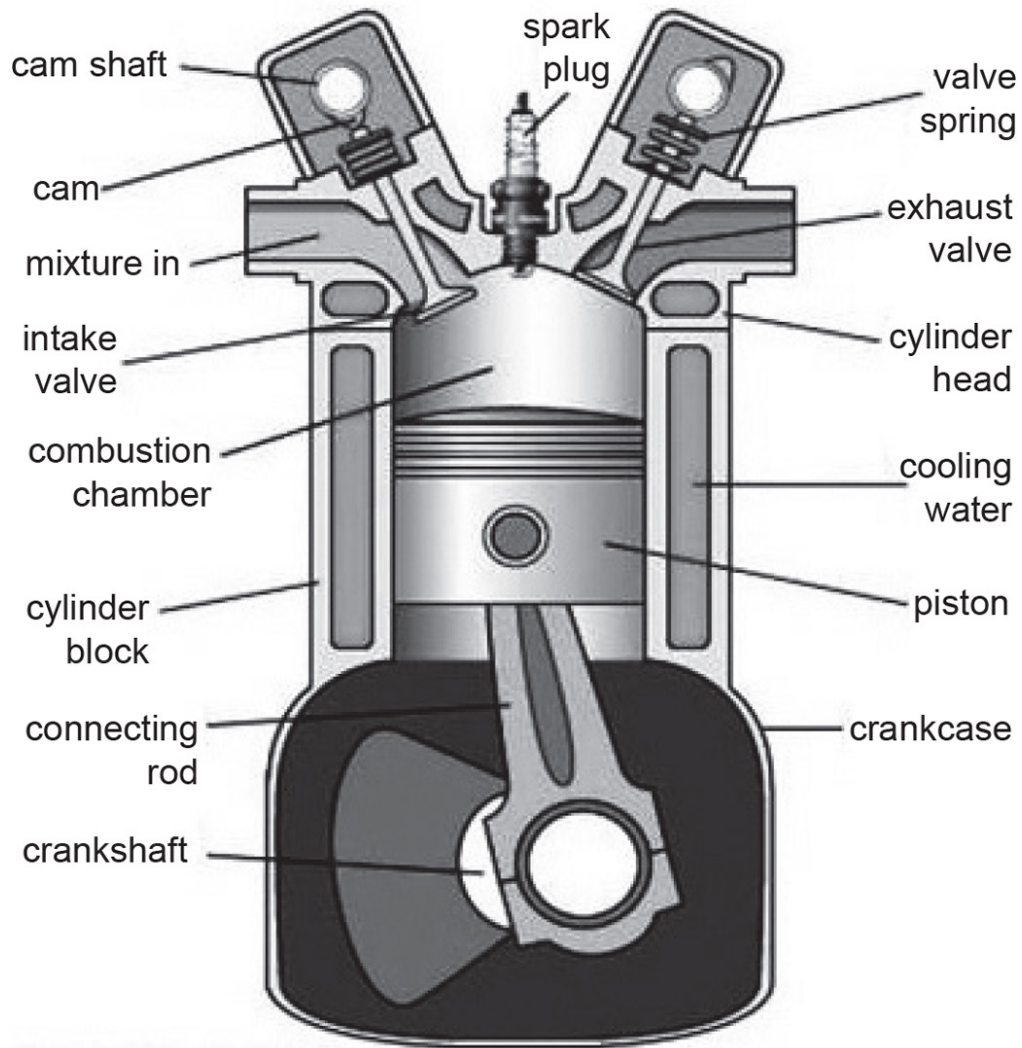
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## IC ENGINES



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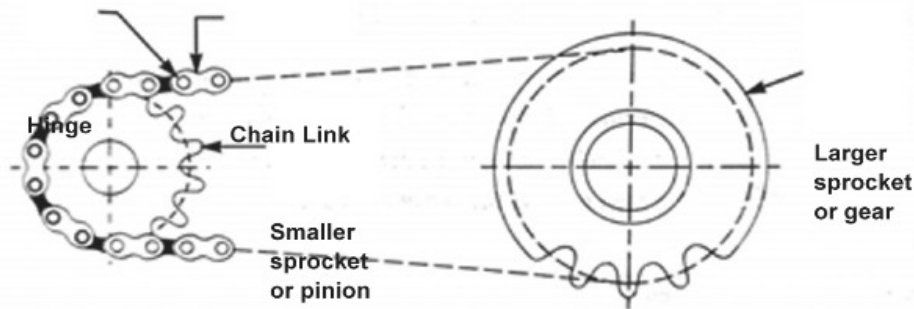
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Mechanical Engineering

SYNOPSIS



## Chain drive

Important characteristics of chain drive are:

- Chain drive operate without slipping and thus provide a positive drive
- Power transmitted between two shafts which are shorter distance than flat belt drive
- Need accurate mounting and careful maintenance
- Lubrication of parts is necessary
- Noisy operation as compared to belt drive

## CENTRIFUGAL PUMP

A **centrifugal pump** is a machine which converts the kinetic energy of the water into pressure energy before the water leaves its casing. Important parts of a centrifugal pump are suction pipe, impeller, casing and delivery pipe. The essential rotating part of a centrifugal pump is known as impeller. It contains series of curved vanes. The impeller is mounted on a shaft which is connected to the shaft of an electric motor which runs the pump. The flow of water leaving the impeller is free vortex.

The **impeller** of a centrifugal pump may have volute casing,

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## Mechanical Engineering

## Mixed questions

- (a) Resilience (b) Creep  
(c) Fatigue (d) All of the above
67. which of the following ferrous alloys can be casted into intricate shapes?
- (a) Plain carbon steels (b) Alloy steels  
(c) Cast irons (c) All of the above
68. Which of the following is not a property of copper alloy?
- (a) High electrical conductivity  
(b) High thermal conductivity  
(c) High strength  
(d) None of the above
69. What is the percentage of carbon in plain carbon steel?
- (a) 60 to 80% (b) Less than 1.7%  
(c) Less than 7% (d) None of the above
70. What are the minimum number of kinematic pairs required in a kinematic chain?
- (a) 2 kinematic pairs (b) 3 kinematic pairs  
(c) 4 kinematic pairs (d) None of the above
71. According to Grashof's law in a four bar chain, one link can complete a rotation only if
- (a) (sum of longest and shortest link length)  $\geq$  (sum of the remaining two link lengths)  
(b) (sum of longest and shortest link length)  $\leq$  (sum of the remaining two link lengths)  
(c) (sum of longest and shortest link length) = (sum of the remaining two link lengths)  
(d) None of the above



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Mechanical Engineering

Production & Manufacturing

## Answer Key - PRODUCTION & Manufacturing

Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.	Q.No.	Ans.
1	C	32	A	94	B	63	A	125	C
2	A	33	C	95	C	64	D	126	C
3	B	34	D	96	B	65	C	127	C
4	B	35	A	97	C	66	A	128	A
5	D	36	D	98	A	67	B	129	B
6	C	37	D	99	B	68	A	130	B
7	B	38	C	100	C	69	B	131	B
8	D	39	A	101	A	70	A	132	D
9	D	40	C	102	A	71	A	133	C
10	C	41	A	103	D	72	C	134	A
11	A	42	D	104	A	73	D	135	B
12	A	43	C	105	C	74	C	136	A
13	B	44	D	106	B	75	C	137	B
14	A	45	C	107	D	76	A	138	D
15	C	46	D	108	A	77	D	139	C
16	C	47	A	109	A	78	B	140	B
17	D	48	C	110	B	79	C	141	B
18	D	49	D	111	D	80	D	142	A
19	B	50	C	112	C	81	C	143	A
20	D	51	A	113	B	82	C	144	C
21	B	52	C	114	C	83	B	145	C
22	B	53	C	115	A	84	B	146	B
23	A	54	C	116	D	85	C	147	B
24	D	55	A	117	D	86	D	148	D
25	D	56	B	118	A	87	C	149	B
26	C	57	C	119	B	88	C	150	B
27	B	58	C	120	A	89	C	151	A
28	C	59	A	121	C	90	B	152	B
29	C	60	A	122	C	91	D	153	A
30	A	61	B	123	B	92	A	154	D
31	A	62	B	124	B	93	C	155	C

