

# AUTO MECHANICAL WORK

## EXAMINATION SCHEME

The examination shall comprise three papers, Papers 1, 2 and 3 all of which should be taken. Papers 1 and 2 shall be composite and will be taken at one sitting.

Paper 1: There shall be 40 multiple choice objective questions for candidates to answer within 45 minutes for 40 marks.

Paper 2: This shall comprise two sections, Sections A and B. The paper will last 2hours 15minutes and carry 80 marks.

Section A: This shall consist of ten short structured questions covering the entire syllabus. Candidates will be required to answer all the questions within 30 minutes for 20 marks.

Section B: This shall consists of five questions out of which candidates will be required to answer any four in 1hour 45minutes for a total mark of 60.

Paper 3: This shall be practical test of 2hours 30minutes duration. It will also carry 80 marks. The test shall have two compulsory questions.

A list of materials required for the test shall be available to schools not less than two weeks before the paper, for the materials to be procured and preparation for the test to be made.

(Alternative to practical)

Alternatively, Council may consider assess candidates' practical capabilities using the alternative to practical work method in the event of constraints on requisite facilities. In this case, there shall be two compulsory questions for candidates to answer within 1½ hours for 80 marks .These shall be test candidates' real time experience in the workshops on safety use of tools, marking out, processing parts to specification, materials use, etc. Freehand sketches of projects, tools and machines relating to Auto Mechanical Work may be required.

## DETAILED SYLLABUS

S/NO.	TOPICS	NOTES
1	Workshop safety and regulations	<ul style="list-style-type: none"><li>- Define safety and regulation</li><li>- Causes of workshop accidents</li><li>- Accident prevention techniques and safety devices e.g. sand bucket, fire extinguishers,etc.</li></ul>

2	Tools and equipment	<ul style="list-style-type: none"> <li>- Types and uses of tools e.g. marking, measuring, holding and cutting tools.</li> <li>- Types and uses of equipment e.g. hand valve, grinding tool etc.</li> <li>- maintenance of tools and equipment.</li> </ul>
3	Vehicle layout	<ul style="list-style-type: none"> <li>- Types of motor vehicle chassis</li> <li>- Principal components, identification and functions (e.g. engine, transmission system, chassis, etc)</li> <li>- Chassis maintenance.</li> </ul>
4	Automobile Engine	<ul style="list-style-type: none"> <li>- Types of engine design.</li> <li>- Identification of main component of an engine.</li> <li>- Line diagram of multicylinder engine.</li> <li>- Types of cylinder liners.</li> <li>- Two stroke and four stroke cycles. (spark ignition engine and compression ignition engine).</li> <li>- Advantages of four stroke cycle over two stroke cycle engine.</li> <li>- Engine maintenance and servicing.</li> </ul>
5	Transmission system	<ul style="list-style-type: none"> <li>- Transmission system layout.</li> <li>- Types of drives.</li> <li>- Components of transmission system e.g. clutch and gear box etc.</li> <li>- Operation of simple plate clutch.</li> <li>- Types and operation of gear box.</li> <li>- Introduction to automatic transmission system.</li> <li>- Conventional layout of transmission system.</li> </ul>
6	Suspension system	<ul style="list-style-type: none"> <li>- Types and functions of suspension systems.</li> <li>- Fault finding, maintenance and repair of suspension system.</li> </ul>
<b>S/NO.</b>	<b>TOPICS</b>	<b>NOTES</b>
7	Steering system	<ul style="list-style-type: none"> <li>- Components and functions of steering system.</li> <li>- Types of steering gearbox.</li> <li>- Manual steering fault and repairs</li> <li>- Operation of power assisted steering.</li> <li>- Steering geometry</li> </ul>
8	Engine lubrication system	<ul style="list-style-type: none"> <li>- Purpose and types of lubrication system.</li> <li>- Friction and its disadvantages.</li> <li>- Component part of lubrication system.</li> <li>- Quality and viscosity of lubricants.</li> <li>- Oil additive and its importance</li> </ul>

9	Cooling system	<ul style="list-style-type: none"> <li>- Function and types of cooling system</li> <li>- Components of water and air cooling systems.</li> <li>- Comparison of air and water cooling systems.</li> </ul>
10	<p>Fuels and combustion</p> <p>(a) Fuel component system</p> <p>(b) Manifold and air cleaner</p>	<ul style="list-style-type: none"> <li>- General layout and working principle of the fuel supply system.</li> <li>- Component parts and function of the fuel supply system.</li> <li>- Types of carburetors, pumps and their maintenance</li> <li>- Types and properties of fuel.</li> <li>- Comparison of mechanical and electrical fuel pumps.</li> </ul> <p>Types, functions and maintenance of:</p> <ul style="list-style-type: none"> <li>(i) Manifold</li> <li>(ii) Air cleaner</li> <li>(iii) Muffler</li> </ul>
11	Braking system	<ul style="list-style-type: none"> <li>- Concept of friction, operating principles and types of braking systems.</li> <li>- Faults and maintenance of mechanical and hydraulically operated braking systems.</li> <li>- Functions, advantages and disadvantages of antilock braking system (A.B.S).</li> <li>- Layout of braking system.</li> </ul>
12	Wheels and Tyres	<ul style="list-style-type: none"> <li>- Types and functions of rims and tyres.</li> <li>- Vulcanizing</li> <li>- Stating regulation for tyre inter changing and pressure.</li> <li>- Road wheels alignment and balancing.</li> </ul>
<b>S/NO</b>	<b>TOPICS</b>	<b>NOTE</b>
13	Workshop management and enterprise	<ul style="list-style-type: none"> <li>- Basic concept of: <ul style="list-style-type: none"> <li>(i) management</li> <li>(ii) planning</li> <li>(iii) controlling</li> <li>(iv) staffing</li> <li>(v) directing</li> </ul> </li> <li>- Managing resources</li> <li>- Concept of authority and responsibilities in enterprising.</li> <li>- Types of enterprise.</li> <li>- Advantages and disadvantages of types of</li> </ul>

		- enterprise in automobile.
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7. LIST OF FACILITIES AND MAJOR EQUIPMENT/MATERIALS REQUIRED:

ITEM NO.	EQUIPMENT	QUANTITY REQUIRED
1	Tool box with lock	5
2	Ball peen hammer	5
3	Hacksaws with extra blades	10
4	300 mm engineer's rule, socket, spanner sets, with ratchet and extension	10
5	6-32mm ring and flat spanners (combined)	5
6	Ring spanners (6-32mm)	5
7	Emery cloth (standard)	5
8	Plug spanners	5
9	Flat spanners (6-32mm)	10
10	Allen keys	5
11	Feeler gauges	5
12	Oil cans	5
13	Grease guns	3
14	Spark plug cleaners	2
15	Combination pliers	5
16	Long nose pliers	5
17	Wire cutter	5
	<b>Measuring tools</b>	
18	Tyre pressure gauges	5
19	Vernier caliper	5
20	Surface gauges	5
21	Surface plates	1
22	Vee blocks	6
23	Micrometer screw gauge	5
24	Dial gauge indicator with magnetic stand	2
	<b>Machine tools</b>	

25	Grinding machine with assorted wheels	1
26	Bench grinder with wheels	1
27	Valve grinding machine	1
	<b>Joining Metals</b>	
28	Blow lamps	3
29	Soldering iron	5
	<b>Lubrication Bay/Tyre and Wheel Service</b>	
30	Compressor (single phase motor driven type complete with spray gun, grease, hose)	1
31	Wheel balancing machine (rim 13 – 15)	1
32	Portable tyre inflator	1
33	Master vulcanizer	1
34	Tyre changer complete with bead breaker	1
35	Tyre repair kit comprising rasp, scissors, tyre knife, sticher, wire brush, etc	2 sets
36	Service station set of tool kit, plus special tools for removal of oil filter	2 sets
37	Pipe wrench, clamp/vice	2 sets
38	Wheel alignment gauge	1 set
39	Clutch alignment jig	2
40	Injector test machine	1
41	Pullers of different sizes	2
42	Work bench with vices	2
43	Portable engine hoist	1
	<b>General/Servicing and reconditioning</b>	
44	Bottle jack (hydraulic) light and heavy	1
45	Used vehicle tyres	1
46	Trolley jacks	2
47	Timing light	1
48	Inspection pits	1
49	Compression gauge	2
50	Valve spring compressor (clamp)	2
51	Coil spring compressor (for suspension)	2
52	Torque wrench pre-set type	2
53	Torque wrench dial type	2
	<b>Tools/Equipment</b>	
54	Piston ring compressor expander	2
55	Axle stands	5
56	Diagnostic testing machine (exhaust gas analyzer)	1
	<b>Other utilities</b>	
57	Fire extinguisher	5

58	Sand buckets	5
59	Water buckets	5
60	Complete engine,gearbox and final drive	1
61	Workshop overalls	25
62	Complete vehicle engine (petrol) (chart)	1
63	Complete vehicle engine (diesel) (chart)	1
64	Complete vehicle and chart	1

**SUGGESTED READING LIST**

S/N	TITTLE	AUTHOR
1	Motor Vehicle Technology	J.A.DOLAN
2	Motor Vehicle Technology (Part 1,2,3 & 4)	S.C .MUDD
3	Automotive Mechanics	WILLIAM H.CROUSE and DONALD L. ANGLIN
4	Fundamental of Motor Vehicle Technology	V.A.W HILLIER and PETER COOMBES
5	Automotive Mechanics For Schools and Colleges	ABA .N.EJEMBI and STEPHEN DAVID
6	The Automobile	HARBANS SINGH REYAT

...DAVIES B.A.....  
NAME AND SIGNATURE OF SUBJECT OFFICER

10<sup>th</sup> September,2013.....  
DATE

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NAME AND SIGNATURE OF HEAD OF SECTION

.....  
DATE

