

**DETAILED SYLLABUS FOR THE POST OF MECHANICAL OPERATOR IN THE  
PHARMACEUTICAL CORPORATION (IM) KERALA LTD. - DIRECT  
RECRUITMENT**

**(Cat.No: 442/2022)**

**MODULE 1 (3 Marks)**

Drilling

Counter sinking & boring, cutting speed and RPM

**Module 2 (4 Marks)**

Lathe driving mechanism, Orthogonal cutting and oblique cutting

**Module 3 (8 Marks)**

Slotting machine

Slotter classification, principle, construction, Safety precaution. Introduction and

their indexing process on a Slotter by its Rotary table graduations. Driving mechanisms, quick return motion and speed ratio. Safety points to be observed

while working on a Slotter.

Job holding devices-vice, clamps, V-block, parallel block etc. Slotting tools-types, tool angles

Spline – types and uses

**Module 4 (15 Marks)**

Milling Machine

Importance of milling, types, parts, construction and specification.

Driving and feed mechanism of Milling Machine.

Different types of milling cutters, cutter nomenclature

Different milling operations - plain, face, angular, form, slot, gang and straddle

milling etc. Up and down milling

Different types of milling attachments and their uses.

Indexing , Calculation of indexing

**Module 5 (10 Marks)**

Grinding

Introduction, grinding wheel, abrasive, types, bond, grade, grit, structure, standard marking system of grinding wheel, selection of the grinding wheel Dressing, types of dresser. Glazing and Loading of wheels – its causes and remedies. Roughness values and their symbols, importance and necessity of quality.

Surface Grinder

Types, Parts, construction, use, methods of surface grinding, specification &

safety

Cylindrical grinder:

Introduction, parts, construction, types, specification, safety, different methods of

cylindrical grinding

Cutting speed, feed, depth of cut, machining time calculation

Tool & cutter grinder

Introduction, parts, construction, use and specification, different types of tool rest

& their application.

Various methods of cutter grinding

Various cutter grinding attachments and their uses

### Module 6 (10 Marks)

CNC machines

CNC TURNING CENTRES

Personal safety, safe material handling, and safe machine operation on CNC turning centers. CNC technology basics, Comparison between CNC and conventional lathes. Concepts of positioning accuracy, repeatability. CNC lathe

machine elements and their functions - bed, chuck, tailstock, turret, ball screws,

guide ways, LM guides, coolant system, hydraulic system, chip conveyor, steady

rest, console, spindle motor and drive, axes motors, tail stock, encoders, control

switches

Machining operations and the tool paths in them – stock removal in turning and

facing, grooving, face grooving, threading, drilling

CNC VERTICAL MACHINING CENTRES

Safety aspects related to CNC VMC.

CNC technology basics, Comparison between CNC VMC and conventional milling machines. Concepts of positioning accuracy, repeatability.

CNC VMC machine elements and their functions - bed, chuck, Auto tool changer

(ATC), ball screws, guide ways, LM guides, coolant system, hydraulic system,

chip conveyor, rotary table, pallet changer, console, spindle motor and drive, axes

motors, encoders, control switches.

Feedback, CNC interpolation, open and close loop control systems.  
Machining operations and the tool paths in them - Face milling, Side milling, Pocket milling, Drilling, Countersinking, Rigid tapping, floating tapping  
Reaming, Rough boring, Finish boring, Spot facing.

## **FITTER TRADE SYLLABUS**

### **Module 1 (22 Marks)**

#### OCCUPATIONAL HEALTH AND SAFETY

Important of safety ,General precautions, First aid, important of PPE , Electrical safety, Important of house keeping, safety signs, Environment guidelines

#### COMMON FITTING WORK IN FITTER WORKSHOP AND NECESSARY TOOLS AND EQUIPMENTS FOR IT

Linear measurement ,Angular measurement, steel rule, divider, caliper, punch, hammers

Filing , different types of files specification and classification of files, bench vice ,hacksaw frame and blade, marking layout tools-Try square, depth gauge, surface gauge, protractor, cold chisel, marking media applications

#### COMMON OPERATIONS

Cutting, filing, chipping, drilling operations, reaming, boring, tapping, threading operations, grinding

Drills and drilling machines, taps, dies and diestock, grinding machine ,specifications of grinding wheels ,surface plate, angle plate, V blocks

#### PRECISION MEASURING INSTRUMENTS

Micrometer- Outside and inside, working principle of micrometer, constructional features, graduations, accuracy, method of measuring, calculation of least count

Vernier caliper- principle, constructional graduations, reading, uses and care, least count, parts, calculation of measurement

Vernier bevel protractor- construction, graduations, reading, uses and care

Vernier height gauge- material constructions, parts, graduations, least count, uses, care and maintenance

Vernier depth gauge

#### METALS

Properties of metals (physical, mechanical, chemical), classifications of steel, alloying elements and their influence on the properties of steel, specific gravity and melting point of metals

Ferrous metals-pig iron, cast iron, wrought iron, steel, production of iron, process and different kinds of furnace in making of iron

Non ferrous metals- properties and features of non-ferrous metals ,aluminium, copper, lead, nickel, gold, silver, tin, zinc, cadmium, tungsten are most commonly used metals.

Non-ferrous alloys- brass, bronze, gun metals, babbitt metals, duralumin, monel metal, muntz metal, Y alloy, german silver, nichrome, hindalium

Forging- forging operations, forging of steel, forging tools- forge, anvil, swage block, hand hammer, sledging hammer, chisel, fullers, flatters, punches and drift,

## HEAT TREATMENT

Purpose of heat treatment, annealing, normalising, hardening, tempering, case hardening, heat treatment of cutting tools, heat treatment of alloy steel, furnace for heat treatment, heat treatment of non -ferrous metals, safety precautions, hardness testing

## Module 2 (5 Marks)

### SHEETMETAL WORK

Laying out, metals used in sheet metal work, snips, mallet, steel square, scratch awl and scriber, compasses, divider, trammel, bunch plates, pliers, hand grover, stakes, mandrels, C clamp, lever shear, circle cutting machine, bending machine, common sheet metal operations, allowance for joints/seames, developments, safety in sheet metal shop

### SOLDERING

Soldering, solders, fluxes, heating devices, joint design, soldering techniques ,soldering safety

### RIVETTING

Rivetting, riveting by hand, riveting by machine, dolly, testing installed rivet, shape of rivet head, advantages and disadvantages of riveting, selection of correct size of rivet, removing of rivet

### WELDING

Safety in welding, general precautions, arc welding, welding machine, polarity in welding, welding positions, welded joints, edge preparation, electrode, selecting the correct electrode, distortion of welding, gas welding, oxy -acetylene welding, filler rods and fluxes, welding positions, welding technique, gas cutting oxidation principle

### GAUGES

Different types of gauges and its uses, limit gauges and fixed gauges, grade as per Indian standard, slip gauges, sine bar, method of use, ring gauge, wire gauge, feeler gauge, plug gauge and snap gauge

## LIMITS AND FITS

Mass production, interchangeability, clearance fit, allowance symbols, tolerance

## PREVENTIVE MAINTENANCE

Lubrication, lubricants and coolants, cutting fluids, maintenance, spirit level, purpose of maintenance, overhauling machine, precautions, alignment of machine

## FASTNERS

Types of threads, fasteners, locking devices, keys, cotters, pins, splines, flangers, couplings, rivets, riveting by hand, riveting by machine, defect in riveting, springs, adhesive bonding, gasket

## **Module 3 (5 Marks)**

### LATHE OPERATIONS

Method of taper turning, facing, centre drilling, chamfering, knurling, polishing, grooving

### LATHE CONSTRUCTION

Machine, machine tool, types of lathe, checking accuracy of main spindle, checking accuracy of tail stock, comparison of lathe and drilling machine

### LATHE ACCESSORIES

Lathe chuck, mounting and dismounting of lathe chuck, toolpost, lathe centre, drive plate, face plate, lathe mandrel, steady rest, lathe carrier, drive plate, toolmakers button

### LATHE TOOLS

Kind of single point cutting tool, different shape of cutting tools, chip breakers, trepanning tool, boring bar, boring tool holders, chasers, centre drill, carbide tool, proper setting of tool, springing of tool, tool materials, properties and classification of tool, tool grinding

## **Module 4 (15 Marks)**

### SCREW AND THREAD

Bolts, nuts, washers, studs, set screws, keys, springs, pins, screw thread element

### LAPPING AND HONING

Lapping, surface finish importance, method of surface finish, lapping purpose, method of lapping, lapping compound, honing, frosting

## BEARINGS

Types of bearings, bearing materials, bearing selection, bearing classification, lubrication of bearings, oil and fluids

## BRAZING AND SOLDERING

Brazing, surface preparations, braze welding, carbon arc brazing, soldering, fluxes in soldering, soldering safety

## JIGS AND FIXTURES

Element of a jig, fixtures, location and supporting in jigs and fixtures, construction of jigs and fixtures, materials for jig and fixtures

## PIPES AND PIPE FITTINGS

Materials used for pipes, specifications, pipe fittings, pipe fitting tools, pipe fitting operations, pipe and tube bending, pipe bending methods

## TRANSMISSION OF POWER

Power transmission elements, belt drives, pulleys, couplings, gears, nomenclature of gear terms, gear wear, broken gear teeth, care and maintenance of gears

## LUBRICANTS AND COOLANTS

Purpose of lubrication, lubricants, coolants, advantages and disadvantages of lubrications, degradations of cutting fluids, criteria for selection of lubricant and coolant

## **Module 5 (3 Marks)**

### PNEUMATICS AND HYDRAULICS

Fluid power, concept of pneumatic system, properties of air, advantages of pneumatics, air generation and distribution, typical compressed air system, compressor, drying of compressed air, actuators, valves, direction control valves, pressure control valves, non return valves, flow control valves, pneumatic control system, pneumatic circuits, pneumatic symbols,

Hydraulics, pascal's law, hydraulics fluids, properties of hydraulics fluids, advantages and disadvantages of hydraulics, reservoir, hydraulic cylinder, hydraulic pumps, hydraulic actuators, control valves, hydraulic wrenches, hydraulic lift, hydraulic press, hydraulic motors, where are hydraulics used? Precautions for handling hydraulic system, hydraulic circuits

### INSTALLATION OF MACHINERY

Erection tools, maintenance, overhauling machine, precautions

**NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.**