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# **ZEAL POLYTECHNIC, PUNE.**

**NARHE | PUNE -41 | INDIA**

**THIRD YEAR (FY) DIPLOMA IN  
MECHANICAL ENGINEERING (ME)**

**SCHEME: I**

**SEMESTER: VI**

**ALL SUBJECTS AS PER MSBTE CURRICULUM**

**MAHARASHTRA STATE BOARD OF TECHNICAL  
EDUCATION, MUMBAI**

**Question Bank : SUMMER-2022  
(Theory Examination)**

## Sample Question Paper:

### Scheme – I

Programme Name : Mechanical Engineering  
Programme Code : ME  
Semester : Sixth  
Course Title : Industrial Hydraulics and Pneumatics  
Marks : 70

22655

Time:3Hrs.

#### Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

#### Q.1) Attempt any FIVE of the following.

(10 Marks)

- a) Compare oil and air as a medium in fluid system
- b) Draw I.S. symbols for i) Bi directional variable discharge pump and ii) Heat Exchanger
- c) State different types of pumps which are available in variable displacement designs
- d) State two applications of double-acting cylinders
- e) State the difference between pressure relief valve and sequence valve
- f) State the use of twin pressure valve and shuttle valve
- g) State the common faults that can be observed in pneumatic circuit

#### Q.2) Attempt any THREE of the following.

(12 Marks)

- a) List different Safety precautions required for handling Industrial hydraulics and pneumatics systems
- b) Explain the working of vane motor with a neat sketch
- c) Explain two applications of check valve with suitable diagram
- d) Explain with neat sketch working of screw compressor

#### Q.3) Attempt any THREE of the following.

(12 Marks)

- a) Compare Gear pump and Piston pump (4 imp point)
- b) Explain the need of pressure and temperature compensation in flow control valve
- c) Out of the three speed control methods, select the suitable one for hydraulic shaper and explain it with circuit diagram
- d) A machine holds the steel sheet and then punches a hole. The sheet is released when the punch goes back. Suggest and draw the suitable circuit for this situation

**Q.4) Attempt any Three of the following.**

**(12 Marks)**

- a) Give full classification of control valves used in fluid system
- b) Explain with neat sketch working of Pressure reducing valve
- c) State any four types of accessories used in pneumatic system along with their function
- d) Draw and explain a suitable circuit in which two actuators move forward simultaneously with same speed
- e) Draw and explain the circuit diagram to control speed of the single acting hydraulic cylinder using air-oil reservoir in hydro pneumatic system

**Q.5) Attempt any TWO of the following.**

**(12 Marks)**

- a) One application needs a single acting cylinder capable of giving longer stroke strength. However the space available to fit in that cylinder in retracted condition is comparatively less. Suggest the type of actuator to be used in such condition with justification. Explain its working with sketch.
- b) Discuss the situations in which following types of center positions of DC valves are preferred i) All ports open and ii) Tandem center
- c) It is required to delay the controlling action by sometime after the actuation of DC valve. Select the suitable valve for this application and explain its working with neat sketch

**Q.6) Attempt any TWO of the following.**

**(12 Marks)**

- a) Draw and explain two pump unloading circuit
- b) A hydraulic press machine can be operated from both the sides. Draw a pneumatic circuit which ensures both hands safely of the worker while operating the machine from any side
- c) Design and draw a hydraulic circuit to achieve following objectives i) piston advances with uniform speed in the first half of forward stroke, ii) with reduced speed in the next half of forward stroke and iii) return quickly

# Sample Question Paper

Scheme – I

ProgrammeName : Mechanical Engineering  
Programme Code : ME  
Semester : Sixth  
Course Title : Automobile Engineering  
Marks : 70

22656

Time: 3 Hrs.

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## Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Preferably, write the answers in sequential order.

### Q.1) Attempt any FIVE of the following.

(10 Marks)

- a) Name any four major components of automobile.
- b) State working principle of clutch.
- c) Define Toe In and Toe out
- d) Enlist any four requirements of suspension system in automobile.
- e) List the main components of battery.
- f) Define HGV and LGV.
- g) State function of universal joint.

### Q.2) Attempt any THREE of the following.

(12 Marks)

- a) State the various types of automobile bodies.
- b) Explain the working of coil spring type single plate clutch with neat sketch.
- c) Describe working of Drum Brake with neat sketch.
- d) State advantages of independent suspension system.

### Q.3) Attempt any THREE of the following.

(12 Marks)

- a) Draw a neat sketch of front engine front wheel type vehicle layout and label it.
- b) Explain the working of recirculating ball type gearbox with neat sketch.
- c) Explain working of Telescopic shock absorber with neat sketch.
- d) Explain working of alternator with neat sketch.

### Q.4) Attempt any Three of the following.

(12 Marks)

- a) State four advantages and disadvantages of LPG as a fuel.
- b) Explain construction and working of Lead acid Battery with neat sketch.
- c) Describe collapsible steering column with neat sketch.

- d) State importance of wire harness and cable colour coding used in automobile lighting system .
- e) Draw a neat sketch of Traffic sign – STOP and NO PARKING.

**Q.5) Attempt any TWO of the following.**

**(12 Marks)**

- a) Explain the construction and working of synchromesh gear box with neat sketch.
- b) Draw a neat layout of ABS and explain its working.
- c) State any six probable causes of tyre wear and give its remedies.

**Q.6) Attempt any TWO of the following.**

**(12 Marks)**

- a) Draw neat sketch of Overdrive and explain its construction and working.
- b) Compare Battery and Magneto Ignition system ( six points) .
- c) Draw labelled layout of a modern service station use in automobile workshop.

**Sample Question Paper:  
Scheme – I**

**Programme Name : Mechanical Engineering**  
**Programme code : ME**  
**Semester :VI Sem**  
**Course Title : Industrial Engineering and Quality Control**  
**Marks :70**

**22657**

**Time :3Hrs.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1) Attempt any FIVE of the following.**

**(10 Marks)**

- a) Define Method Study. State its objectives.
- b) state the factors of production
- c) Enlist various QC tools
- d) Name the various control charts in SQC
- e) State the types and location of display.
- f) State the characteristics of Quality
- g) State the merits of acceptance sampling.

**Q.2) Attempt any THREE of the following.**

**(12 Marks)**

- a) Explain in brief different "Recording Techniques" used in Method study
- b) Describe 'Part Print Analysis' with suitable example.
- c) Explain Ergonomic considerations applied to types and location of display
- d) Differentiate between Inspection & quality control

**Q.3) Attempt any THREE of the following.**

**(12 Marks)**

- a) Define process chart .draw the symbols used in process chart
- b) Prepare a two handed process chart for a task of sharpening the pencil with appropriate process chart symbol
- c) State considerations for selection of manufacturing processes for a given product
- d) Apply ergonomics aspect for designing Lever for hand Press Machine

**Q.4) Attempt any THREE of the following.**

**(12 Marks)**

- a) Write different steps to be followed for Ergonomic consideration in Machine design.
- b) Apply Ergonomic principles for designing Display unit of Reciprocating air Compressor.
- c) With suitable example explain the criterion for machine selection.
- d) Explain in detail OC curve and show following element on OC curve.
  - i)  $\alpha$ -Risk
  - ii)  $\beta$ -Risk
  - iii) AOQ
  - iv) LTPD

- e) In a manufacturing process the number of defectives found in the inspection of 10 lots of 400 items each are given below

lot Number	01	2	3	4	5	6	7	8	9	10
No. of defectives	2	0	14	3	1	18	6	0	3	6

Determine the trial control limits for np chart.

**Q.5) Attempt any TWO of the following.**

**(12 Marks)**

- Outline an appropriate process chart for the activity "replace old battery of car"
- Draw and explain Histogram, Pareto chart and Scatter diagram.
- 10 samples of size 5 have been collected with following observations :

Sr. No.	1	2	3	4	5	6	7	8	9	10
- X	2.011	2.008	2.001	2.003	1.998	1.995	1.997	1.997	2.002	2.003
R	0.011	0.017	0.009	0.026	0.27	0.21	0.014	0.017	0.023	0.015

Given  $A_2 = 0.577$ ,  $D_3 = 0$ ,  $D_4 = 2.114$

Draw the appropriate control chart

**Q.6) Attempt any TWO of the following.**

**(12 Marks)**

- Draw the X-R control chart and explain the following terms on it
  - Extreme variations
  - Shift
  - Indication of trend.
- The following table gives the no. of defects in alignment observed at the final inspection of a certain model of an aero plane, prepare a C-chart and comment on it.

Aeroplane Number	01	2	3	4	5	6	7	8	9	10	11	12	13
No. of alignment defect	07	6	6	7	4	7	8	12	9	9	8	5	5

c) Two machines producing components are checked up for the statistical stability. Draw the 'P' chart for both machines and comment upon the processes. Sample size for both machines are 200.

Machine A:

Sample No.	1	2	3	4	5	6	7	8	9	10
Defectives	25	28	30	30	20	29	31	26	31	27

Machine B:

Sample No.	1	2	3	4	5	6	7	8	9	10
Defectives	11	08	22	15	12	27	10	15	10	02





**Sample Question Paper**  
**Scheme – I**

**22661**

**Programme Name** : Mechanical Engineering  
**Programme code** : ME  
**Semester** : VI  
**Course Title** : Renewable Energy Technologies  
**Marks** : 70

**Time : 3 Hrs.**

**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1) Attempt any FIVE of the following.**

**(10 Marks)**

- a) Classify Solar Thermal System
- b) List applications of Bio Fuel
- c) State the function of PV Cell
- d) Write specification of HAWT
- e) Name any four components of Micro Hydro Power System
- f) Define term ' Battery rating'
- g) Name any four Hybrid systems

**Q.2) Attempt any THREE of the following.**

**(12 Marks)**

- a) Differentiate between flat plate collectors and Parabolic Collectors
- b) Write different methods of Battery selection
- c) Explain the importance of Small Vertical Axis wind Turbines
- d) Write maintenance procedure of Micro hydro Power system

**Q.3) Attempt any THREE of the following.**

**(12 Marks)**

- a) Explain working of Solar dryer with neat sketch
- b) Explain the term ' Net Metering'
- c) Write maintenance procedure of ' Bio gas plant'
- d) Draw layout of 'Bio mass power plant.

**Q.4) Attempt any Three of the following.**

**(12 Marks)**

- a) Write installation procedure for Micro hydro power systems in brief
- b) Explain the working of wind- solar Hybrid system
- c) List different performance parameters for testing performance of Wind solar PV Hybrid system
- d) Explain with neat sketch working of VAWT
- e) List the applications of Micro Hydro power systems

**Q.5) Attempt any TWO of the following.**

**(12 Marks)**

- a) Explain with neat sketch the construction of 'Solar Tower'
- b) Write in detail the maintenance procedure of large Horizontal axis wind turbine
- c) Explain the installation procedure for solar roof Top system

**Q.6) Attempt any TWO of the following.**

**(12 Marks)**

- a) Write the standard installation procedure for 'Industrial Process heating Application,
- b) Prepare project feasibility report for Wind -Biogas plant
- c) Explain with neat sketch the construction of ' smokeless Chulhas.