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**4th Sem. / Mech. / Auto**

**Subject : Hydraulics & Pneumatics**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:**Objective type questions. All questions are compulsory. (10x1=10)

**(Course Outcome/CO)**

- Q.1 Define Pneumatics (CO-9)
- Q.2 Write the SI units of weight density (CO-1)
- Q.3 Venturimeter is used to measure \_\_\_\_\_ of a liquid flowing through a pipe. (CO-4)
- Q.4 List any two types of fluids. (CO-1)
- Q.5 Write name of any two types of turbine (CO-6)
- Q.6 Write SI units of Discharge. (CO-3)
- Q.7 For flow in the pipe to be laminar, Reynold's number should be \_\_\_\_\_ (CO-5)
- Q.8  $1 \text{ Ns/m}^2 =$  \_\_\_\_\_ poise (CO-1)
- Q.9 Define Atmospheric Pressure. (CO-2)

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- Q.10 Write the relationship between  $C_c$ ,  $C_v$  &  $C_d$ . (CO-4)

**SECTION-B**

**Note:**Very Short answer type questions. Attempt any ten parts out of twelve questions. (10x2=20)

- Q.11 Define vena-contracta. (CO-4)
- Q.12 Define Steady Flow. (CO-3)
- Q.13 Define Ideal fluid. (CO-1)
- Q.14 State Pascal's Law (CO-8)
- Q.15 Name two commonly used seal materials. (CO-9)
- Q.16 Define Nozzle. (CO-5)
- Q.17 Define Laminar Flow. (CO-3)
- Q.18 Write the relationship between mass density & weight Density. (CO-1)
- Q.19 Define coefficient of discharge. (CO-4)
- Q.20 Define Compressibility. (CO-1)
- Q.21 Write the formula for loss of head due to sudden expansion. (CO-5)
- Q.22 Write the function of Air Compressor in pneumatic system. (CO-9)

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### SECTION-C

**Note:** Short answer type questions. Attempt any eight questions out of ten questions. (8x5=40)

- Q.23 Explain Water Hammer (CO-5)
- Q.24 Explain Darcy Weisbach formula of head loss. (CO-5)
- Q.25 Explain pitting & cavitation in pumps (CO-7)
- Q.26 Write any five difference between reciprocating & centrifugal pump. (CO-2)
- Q.27 Explain with graph relationship between atmospheric pressure, gauge pressure & absolute pressure. (CO-2)
- Q.28 State Bernoulli's Theorem & write its limitations. (CO-4)
- Q.29 Explain Continuity Equation of Flow. (CO-3)
- Q.30 Write any five properties of an ideal hydraulic oil. (CO-9)
- Q.31 The diameters of a pipe at section 1-1 & 2-2 are 300mm & 500 mm respectively. If the velocity of water flowing through the pipe at section 1-1 is 5m/s. Find

- a) Discharge through the pipe
- b) Velocity of water at section 2-2 (CO-3)

Q.32 If  $4.5 \text{ m}^3$  of an oil weighs 45.5 KN find its specific weight, Mass Density & Relative Density(CO-1)

### SECTION-D

**Note:** Long answer type questions. Attempt any three questions. (3x10=30)

- Q.33 Explain Discharge Measurement with the help of venturimeter. (CO-4)
- Q.34 Explain the construction & working of hydraulic ram with diagram. (CO-8)
- Q.35 Explain the construction & working of Francis Turbine with diagram. (CO-6)
- Q.36 Water is flowing through a pipe having diameters 40cm & 25 cm at sections A & B respectively. The rate of flow through pipe is 50 litres per second. The section A is 10m above datum & section B is 8m above datum. If pressure at section A is  $45 \text{ N/cm}^2$ , find the intensity of pressure at section B. (CO-4)

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**4th Sem. / Mechanical Engg./  
Auto/ Prod./Mech. (CAD / CAM)**

**Subject : Material and Metallurgy Mat. Sc.**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:**Objective type questions. All questions are compulsory (10x1=10)

- Q.1 Define fatigue.
- Q.2 Define Wrought iron.
- Q.3 Define metalloids.
- Q.4 Name any two semi conductors.
- Q.5 Define amorphous solids
- Q.6 In BCC structure  $r = \underline{\hspace{2cm}}$
- Q.7 Define Atomic packing factor.
- Q.8 Define atomic radius.

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Q.9 Write full form of HCP.

Q.10 Bronze is alloys of \_\_\_\_\_ and \_\_\_\_\_.

**SECTION-B**

**Note:**Very short answer type questions. Attempt any ten questions out of twelve questions. 10x2=20

- Q.11 Name types of line defects.
- Q.12 Define Peritectic
- Q.13 Write few examples of solid solution on alloys.
- Q.14 Name any two iron ores.
- Q.15 Define Curie point.
- Q.16 Name different types of high speed steel.
- Q.17 Define twinning.
- Q.18 Define annealing.
- Q.19 Write the applicants of carburizing.
- Q.20 Name types of pyrometers.

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Q.21 Define thermoplastic.

Q.22 Name any two synthetic rubber.

### SECTION-C

**Note:** Short answer type questions. Attempt any eight questions out of ten questions.  $8 \times 5 = 40$

Q.23 Write the uses of bio materials

Q.24 Write the advantages semi conductors.

Q.25 Calculate number of atoms per unit cell in HCP structure.

Q.26 Calculate atomic radius is FCC structure.

Q.27 Define screw dislocation.

Q.28 Differentiate between slip and twinning.

Q.29 Define dendritic solidification of pure metal.

Q.30 Explain the various properties of solid solution alloys.

Q.31 Explain the basic steel for general purpose.

Q.32 Define the various properties of rubber.

### SECTION-D

**Note:** Long answer type questions. Attempt any three questions out of four questions.  $3 \times 10 = 30$

Q.33 Explain the various types of cast iron with uses and properties.

Q.34 Explain the effects of various alloying elements in steel.

Q.35 Explain Aluminum alloys with uses and properties

Q.36 Explain tempering heat treatment process.

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**4th Sem. / Mechanical**

**Subject : Thermodynamics-I**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:**Objective type questions. All questions are compulsory (10x1=10)

**(Course Outcome/CO)**

- Q.1 In a closed system, there is no transfer of \_\_\_\_\_ across the system boundary. (CO-1)
- Q.2 The S.I unit of heat is \_\_\_\_\_ (CO-1)
- Q.3 Constant temperature process is also know as \_\_\_\_\_ process (CO-2)
- Q.4 A perfect gas obeys \_\_\_\_\_ under all conditions of temperature and pressure.(CO-3)
- Q.5 In adiabatic process, no \_\_\_\_\_ transfer takes place across the system boundary.(CO-4)
- Q.6 In \_\_\_\_\_ boilers, water is contained inside the tubes which are surrounded by flame and hot gases. (CO-5)

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Q.7 Efficiency of otto cycle is = (CO-5)

Q.8 Axial flow compressor is a type of \_\_\_\_\_ compressor (CO-5)

Q.9 In the throttling process, work done = (CO-6)

Q.10 According to Boyle's Law  $PV =$  (CO-2)

**SECTION-B**

**Note:**Very Short answer type questions. Attempt any ten parts out of twelve questions. (10x2=20)

- Q.11 Define Avogadro's law (CO-1)
- Q.12 Define throttling process (CO-1)
- Q.13 Define ideal gas. (CO-1)
- Q.14 Name any two types of boiler mounting.(CO-2)
- Q.15 Define fire tube boilers. (CO-3)
- Q.16 Define air standard efficiency (CO-4)
- Q.17 Define an air compressor. (CO-4)
- Q.18 Define dryness fraction. (CO-4)
- Q.19 Define superheated steam. (CO-6)
- Q.20 State Kelvin-Planck statement of second law thermodynamics. (CO-2)
- Q.21 Define perpetual motion machine of second kind. (CO-2)
- Q.22 Define thermodynamics equilibrium. (CO-5)

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### SECTION-C

**Note:** Short answer type questions. Attempt any eight questions out of ten questions. (8x5=40)

Q.23 Explain reversible and irreversible process briefly. (CO-1)

Q.24 Explain constant pressure process with the help of P-V diagram. (CO-2)

Q.25 Drive general energy equation for a steady flow process. (CO-2)

Q.26 Write any five difference between water and fire tube boilers. (CO-3)

Q.27 Explain an otto cycle. Also drive expression for its efficiency. (CO-4)

Q.28 Explain the working of single stage reciprocating air compressor with the help of neat sketch. (CO-5)

Q.29 Drive the relationship between specific heat  $C_p$  and  $C_v$  (CO-3)

Q.30 Explain briefly closed system and open system. (CO-6)

Q.31 Give any five difference between reciprocating and rotary air compressors. (CO-6)

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Q.32 Define thermodynamics property, Explain its types briefly. (CO-2)

### SECTION-D

**Note:** Long answer type questions. Attempt any three questions out of four questions. (3x10=30)

Q.33 Explain the construction and working of Nestler boiler with the help of neat sketch. (CO-4)

Q.34 Enlist the boiler accessories. Explain any two accessories with diagram. (CO-6)

Q.35 Explain first law of thermodynamics with the help of Joule's experiment. (CO-2)

Q.36 Explain the process of formation of steam with help of neat diagram between temperature and heat supplied. (CO-1)

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**4th Sem. / Mechanical**

**Subject : Workshop Technology-II**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:**Objective type questions. All questions are compulsory. (10x1=10)

- Q.1 Grinding wheel is a/an \_\_\_\_\_ point cutting tool. (CO-1)
- Q.2 Size of radial drilling machine is specified by \_\_\_\_\_. (CO-2)
- Q.3 The tailstock centre is called \_\_\_\_\_. (CO-2)
- Q.4 Three jaw chuck is also known as \_\_\_\_\_. (CO-2)
- Q.5 Stub boring bar is mostly used to bore \_\_\_\_\_. (CO-3)
- Q.6 Shaper uses \_\_\_\_\_ point cutting tool. (CO-4)
- Q.7 Push broach is \_\_\_\_\_ in length as compared to pull broach. (CO-5)

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- Q.8 A fixture is \_\_\_\_\_ to the machine table. (CO-6)
- Q.9 A cutting fluid should have \_\_\_\_\_ viscosity. (CO-6)
- Q.10 A good lubricant should have \_\_\_\_\_ fire point. (CO-6)

**SECTION-B**

**Note:**Very Short answer type questions. Attempt any ten Questions out of twelve questions.

(10x2=20)

- Q.11 Name the two types of cutting tool. (CO-1)
- Q.12 Define size of a drilling machine. (CO-2)
- Q.13 Define facing. (CO-3)
- Q.14 Name any four principle parts of lathe machine. (CO-3)
- Q.15 Give two advantages of jig boring machine. (CO-4)
- Q.16 Define grooving. (CO-2)
- Q.17 Name any two types of boring machines. (CO-4)
- Q.18 Name any two work holding devices of a shaper. (CO-5)
- Q.19 Define broach. (CO-6)

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- Q.20 Define fixture. (CO-5)  
Q.21 Name any two types of lubricants. (CO-6)  
Q.22 Define flash point of a lubricant. (CO-6)

### SECTION-C

**Note:** Short answer type questions. Attempt any eight questions out of ten questions. (8x5=40)

- Q.23 Explain single point cutting tool geometry with the help of a diagram. (CO-1)  
Q.24 Explain the principle of drilling with neat diagram. (CO-2)  
Q.25 Write five advantages of twist drill. (CO-2)  
Q.26 Explain any two work holding devices for lathe machine in detail. (CO-3)  
Q.27 Explain taper turning process with neat diagram. (CO-3)  
Q.28 Explain the working of table type boring machine with diagram. (CO-4)  
Q.29 Explain any two shaping operations with the help of a neat diagram. (CO-4)  
Q.30 Explain different elements of a broach with the help of neat sketch. (CO-5)

- Q.31 Write any five difference between jig and fixture. (CO-6)  
Q.32 Explain mist method to apply cutting fluid to the cutting tool with diagram. (CO-6)

### SECTION-D

**Note:** Long answer type questions. Attempt any three questions out of four. (3x10=30)

- Q.33 Draw and explain the nomenclature of twist drill. (CO-2)  
Q.34 Explain any five lathe operations with the help of neat diagram. (CO-1)  
Q.35 Explain the elements of a shaping machine. (CO-3)  
Q.36 Explain the characteristics of good lubricants in detail. (CO-6)

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**4th Sem. / Mechanical Engg.**  
**Subject : Industrial Engineering**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:** Objectives questions. All questions are compulsory (10x1=10)

**(Course Outcome/CO)**

- Q.1 Define productivity. (CO-1)  
Q.2 Define bottlenecks. (CO-2)  
Q.3 Draw symbol of transportation. (CO-3)  
Q.4 Draw symbol of assembly. (CO-3)  
Q.5 Define standard rating. (CO-4)  
Q.6 Give full form of P.M.T.S. (CO-3)  
Q.7 Define Wage. (CO-4)  
Q.8 Define direct worker. (CO-4)

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- Q.9 Write full form of CPM. (CO-5)  
Q.10 Write the types of store. (CO-9)

**SECTION-B**

**Note:** Very Short answer type questions. Attempt any ten parts 10x2=20

- Q.11 Give the types of factors affecting productivity. (CO-1)  
Q.12 Define production function. (CO-1)  
Q.13 Define work measurement. (CO-2)  
Q.14 Write the factors for selecting the job for work study. (CO-3)  
Q.15 Give the objectives of motion analysis. (CO-5)  
Q.16 Describe rest allowance. (CO-4)  
Q.17 Define work sampling. (CO-6)  
Q.18 Name different types of incentives. (CO-4)  
Q.19 Define loading. (CO-5)  
Q.20 Name the two types of dispatching. (CO-8)

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Q.21 Describe a bin card. (CO-7)

Q.22 Define inventory. (CO-9)

### SECTION-C

**Note:** Short answer type questions. Attempt any eight questions. 8x5=40

Q.23 Explain the causes of decrease in productivity. (CO-1)

Q.24 Enlist the advantages of work study. (CO-2)

Q.25 Describe a flow diagram, Give the procedure for drawing a flow diagram. (CO-3)

Q.26 What is a two handed process chart. Explain with example. (CO-5)

Q.27 Write the procedure of motion analysis. (CO-7)

Q.28 Write the method of calculating standard time. (CO-5)

Q.29 Write the characteristics of a good wage incentive plan. (CO-4)

Q.30 Explain the incentive schemes for indirect  
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workers. (CO-4)

Q.31 Differentiate between PERT and CPM techniques. (CO-5)

Q.32 Write the benefits of EOQ method of inventory control. (CO-9)

### SECTION-D

**Note:** Long answer type questions. Attempt any three questions. 3x10=30

Q.33 Explain the human aspect of work study and give the role of work study in improving productivity. (CO-2)

Q.34 Define ergonomics. Explain the objectives and applications of ergonomics in detail. (CO-6)

Q.35 Explain in detail various types of allowances considered for a worker while carrying out time study. (CO-8)

Q.36 Explain the various functions of Production Planning and Control department. (CO-6)

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**4th Sem. / Mech. Engg./Prod./CAD/CAM/  
CNC/Fabrication Tech.**

**Subject : Machine Design and Drawing**

Time : 3 Hrs.

M.M. : 100

**SECTION-A**

**Note:**Objective type questions. All questions are compulsory. (10x1=10)

- Q.1 Unit of strain is \_\_\_\_\_.
- Q.2 Name the material used for key.
- Q.3 What is the angle between principal planes.
- Q.4 Give the maximum value of pressure angle.
- Q.5 Define crest of thread.
- Q.6 The shear stress on principal plane is \_\_\_\_\_
- Q.7 Hook's law holds good upto \_\_\_\_\_
- Q.8 Shafts are designed on the basis of \_\_\_\_\_ and \_\_\_\_\_.
- Q.9 C.I and glass are the example of \_\_\_\_\_ material. (Brittle/Ductile)

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Q.10 The standard taper of the taper key is \_\_\_\_\_.

**SECTION-B**

**Note:**Very short answer type questions. Attempt any ten questions out of twelve questions. (10x2=20)

- Q.11 Name the methods of reducing stress-concentration.
- Q.12 Define Equivalent Bending Moment.
- Q.13 What is Standard.
- Q.14 Give the function of cam.
- Q.15 Define screw thread.
- Q.16 Define key-way.
- Q.17 Name different theories of failure.
- Q.18 Define F.O.S.
- Q.19 Define machine design and its various types.
- Q.20 Define Pitch of a thread.
- Q.21 State normal strain theory.
- Q.22 What do you mean by angle of thread.

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### SECTION-C

**Note:** Short answer type questions. Attempt any two questions out of three questions. (2x20=40)

Q.23 A solid shaft is transmitting 1.2 MW at 250 rpm. Find out the diameter of shaft if the maximum torque exceeds the mean torque by 25%. Take maximum allowable shear stress is 65 MPa.

Q.24 a) Explain the general procedure of designing the new machine.

b) Explain the characteristics of a good designer.

Q.25 A rectangular sunk key 16 mm wide, 12mm thick and 80mm long is required to transmit a torque 25 KNm from a 100 mm diameter shaft. Calculate the induced shear and crushing stress in the key.

### SECTION-D

**Note:** Long answer type questions. Attempt any one questions out of two questions. (3x10=30)

Q.26 Design and draw a screw jack which is used to lift a load of 110 KN through a height of 450 mm. The elastic strength of material of screw in

tension and compression is 210 N/mm<sup>2</sup> and in shear 120 N/mm<sup>2</sup>. The elastic strength of material of nut is 110 N/m<sup>2</sup> in tension, 100 N/mm<sup>2</sup> in compression and 90 N/mm<sup>2</sup> in shear. The bearing pressure between nut and screw does not exceed 18 N/mm<sup>2</sup>.

Q.27 A knife edge follower is operated by a cam. with the help of following data, draw the profile of cam.

a) Cam lift the follower by 40mm in S.H.M during 60° of its rotation.

b) To dwell for the next 35°.

c) Then for further 90° of rotation of follower comes to its original position in S.H.M.

d) During rest of rotation, the follower remains stationery. The least radius of cam is 50mm.

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