Answer in your own words.

Answer five *questions in which* Question No. 1 is compulsory *and* any four *from rest questions.*

All questions carry equal marks.

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1. Choose the correct answer: 2×8=16

(a) The property of a material which enables it to resist fracture due to high impact loads is known as

(i) elasticity (iii) resilience

(ii) toughness (iv) endurance

(b) Rankine's theory of failure is applicable to following type of materials:

(i) brittle (iii) elastic

(ii) plastic (iv) ductile

(c) Stress concentration is cyclic loading is more serious in

(i) ductile material (iii) equal in (i) & (ii)

(ii) brittle material (iv) None of these

(d) The crest diameter of screw thread is same as

(i) pitch diameter (iii) minor diameter

(ii) core diameter (iv) major diameter

(e) Rivets are generally specified by

(i) thickness of plate (iii) diameter of head

(ii) length of rivet (iv) nominal diameter

(f) In a multiple V-belt drive, when a single belt is damaged it is preferable to change the complete set in order to

(i) reduce vibration (iii) reduce slip

(ii) ensure uniform loading (iv) ensure proper alignment

(g) A screw is said to be 'overhauling' if the

(i) friction angle is less than helix angle

(ii) friction angle is more than helix angle

(iii) friction angle is equal to helix angle

(iv) efficiency is 100%

(h) A cotter joint is used to connect two _____ rods.

(i) parallel

(ii) perpendicular

(iii) coaxial

(iv) None of these

2. (a) State the steps involved in general machine design procedure.

(b) Define stress concentration and illustrate methods to reduce it. 8×2=16

3. Design a cotter joint to connect two MS rods for a tensile load of 25 kN. The maximum permissible stress are as 16

Tensile stress = 56 N/mm^2

Shear stress = 40 N/mm^2

Crushing stress = 70 N/mm^2

Or,

Design a knuckle joint required to withstand a tensile load of 30 kN. The permissible stresses are as Tensile stress = 56 N/mm^2, Shear stress = 40 N/mm^2 and Crushing stress = 70 N/mm^2. 16

4. (a) Explain the effect of keyways on strength of a shaft.

(b) Find the diameter of a solid shaft to transmit 20 kW at 200 rpm. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 6. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameter is 0·5. 4+12=16

5. A screw jack carries a load of 22 kN. Assuming the coefficient of friction between screw and nut is 0·2, design screw jack and nut.

Neglect collar friction and column action. The permissible compressive and shear stress in screw should not exceed 42 N/mm^2 and 28 N/mm^2 respectively. The shear stress should exceed 21 N/mm^2 in the nut. The bearing pressure on the nut is 14 N/mm^2. 16

6. (a) State the significance of 'Wahl's correction factor'.

(b) A helical spring is made from a wire of 6 mm diameter and has a outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity is 84 MPa, find the axial load which the spring can carry and the deflection per active turn. 6+10=16

7. (a) State the various assumptions made in design of rivetted joints.

   (b) A plate of 100 mm width and 10 mm thick is to be welded with another plate by means of transverse welds at each end. If the plates are subjected to a load of 30 kN, determine the length of the welds, if the allowable tensile stress for weld material is 80 N/mm^2. 6+10=16

8. Write short notes on any four: 4×4=16

   (a) S–N curve

   (b) Levers

   (c) Man-machine relationship

   (d) Leaf spring

   (e) Thread profile

Diploma 6th Semester Examination, 2021 (New Syllabus)

Subject : Industrial Fluid Power **Full Marks : 80**

Subject Code : MEC-605

Time : 3 Hours **Pass Marks : 26**

Answer five *questions in which* Question No. 1 is compulsory
and answer any four *from rest questions.*
All questions carry equal marks.

1. Choose the correct answer: 2×8=16

(a) The power system used in the machine meant for heavy lifting work is

(i) Reciprocating (ii) Pneumatic

(iii) Hybrid (iv) Hydraulic

(b) In a hydraulic system, oil is pressurized by

(i) Compressor (ii) Pump

(iii) Motor (iv) Valve

(c) Which of the following is a rotary pump?

(i) Rotating cylinder pump (ii) Axial piston pump

(iii) Radial piston pump (iv) Vane pump

(d) The function of a DC valve is to change

(i) Pressure (ii) Velocity

(iii) Discharge (iv) Direction

(e) Rack and Pinion pair is used in

(i) reciprocating actuator (ii) gear pump

(iii) limited rotary actuator (iv) None of these

(f) Which one of the following is not used in a pneumatic system?

(i) Compressor (ii) FRL unit

(iii) Air receiver (iv) Pump

(g) Which one of the following is not the component of a time delay valve?

(i) Lever (ii) Inbuilt air reservoir

(iii) Spool (iv) Built in unidirectional flow control valve

(h) A (3×2) DC valve of pneumatic system has

(i) 3 ports, 2 positions

(ii) 2 ports, 3 positions

(iii) 2 ports, 2 positions

(iv) 3 ports, 3 positions

8×2=16

2. Attempt *any two* questions:

(a) Draw and explain Meter-in and Meter-out circuit.

(b) Describe Hydraulic circuit for milling machine.

(c) What is Bleed-off circuit? Explain with neat diagram.

8×2=16

3. Attempt *any two* questions:

(a) Describe the construction, working and symbol of pressure relief valve, used in hydraulic circuit.

(b) Explain the classification of vane pump with neat sketch.

(c) Describe briefly construction and working of screw pump.

8×2=16

4. Attempt *any two* questions:

(a) Describe the construction and working of Hydraulic motors with symbols.

(b) What are functions of oil fillers? Give its classification.

(c) Why accumulators are used in hydraulic circuit? Explain any one type of accumulator with neat sketch.

8×2=16

5. Attempt *any two* questions:

(a) Give classification of air motors. Explain any one with neat sketch.

(b) What is FRL unit? Describe its function with neat sketch.

(c) Classify pipe fittings in pneumatic system. Explain any one of them.

8×2=16

6. Answer *any two* questions:

(a) Classify and draw symbols for control valves used in pneumatic system.

(b) Draw a circuit diagram and explain the speed control for bi-directional air motor.

(c) Explain the working of sequence circuit for two double acting air cylinders.

4×4=16

7. Write short notes on *any four*:

(a) Poppet valve

(b) Merits and demerits of pneumatic system

(c) General layout of oil Hydraulic system

(d) Properties of Hydraulic fluid

(e) Classification of Rotary air compressor with their applications

(f) Accessories of Pneumatic system

Diploma 6th Semester Examination, 2021 (New Syllabus)

Subject : Measurements & Automation **Full Marks : 80**

Subject Code : MEC 606

Time : 3 Hours **Pass Marks : 26**

Answer five *questions in which Question No.1 is compulsory.*

2×8=16

1. Multiple choice questions:

(i) Output of a bimetallic element will be

(a) strain

(b) pressure

(c) displacement

(d) voltage

(ii) The degree of exactness of a measurement compared to the expected value is known as

(a) accuracy

(b) precision

(c) resolution

(d) measurement

(iii) The devices used for flow obstruction is/are

(a) orifice plate

(b) venturi tube

(c) flow nozzle

(d) All of the above

(iv) Elastic limit is the print

(a) up to which stress is proportional to strain.

(b) at which elongation take place without application of additional load.

(c) up to which if the load is removed, original volume and shapes are regained.

(d) None of the above

(v) Strain gauge rosettes are used when

(a) direction of hoop stress is not known.

(b) direction of principal stress is known.

(c) direction of principal stress is not known.

(d) direction of longitudinal stress is not known.

(vi) Which of the following is not a programming language for computer controlled robot?

(a) AMU

(b) VAL

(c) RAIL

(d) HELP

(vii) Which of the following represents relation for a pressure change in a column?

(a) $H\rho g$

(b) ρg

(c) hg

(d) h

(viii) Which materials processing technology gives the advantage of precision, accuracy and optimum use of cutting tools which maximise their life and higher labour productivity?

(a) Industrial robots

(b) NC (and CNC) machine tools

(c) Computer integrated manufacturing (CIM)

(d) Flexible Manufacturing System

2. (a) Define measurement. Give classification of measurement.

(b) Define error. Explain the detail classification of error. 8+8=16

3. Define *any four* terms: 4×4=16

(a) Active transducer and passive transducer

(b) Quartz thermometer

(c) Thermocouple and thermistor

(d) Hysteresis and Dead zone

(e) Overshoot

(f) Repeatability and Reproducibility

(g) Threshold

4. (a) Explain the working of rotameter with the help of neat diagram.

   (b) Explain the working of Eddy current dynamometer. 8+8=16

5. (a) Define strain gauge. Explain different types of strain gauge.

   (b) Strain gauge is bonded to a beam 0·2 m long and has a cross-sectional area 8 cm^2. Young's modules for steel is 207 GN/m^2. The gauge has an unstrained resistance of 480 ohms and a gauge factor of 2·2. When the load is applied the resistance of gauge changes by 0·026 ohms. Calculate the change in length of the steel beam and the amount of force applied to the beam. 8+8=16

6. (a) What are the different levels of Automation? Describe the types and components of Flexible Manufacturing System (FMS).

   (b) Explain robot grippers and robot sensors. 8+8=16

7. (a) Draw neat sketch of Radiation Pyrometer and explain how it is used for measurement of temperature.

   (b) Explain construction and working of bimetallic thermometer.

   Or,

   Draw neat sketch of RVDT. Explain its working and state any two applications. 8+8=16

MECH.

DIPLOMA 6TH SEMESTER SPECIAL(OLD SYLLABUS) EXAMINATION 2021

Subject:-Production Technology **Full Marks :- 100**
Subject code:- PTE 12243 **Pass Marks :- 40**
Time: 3 Hrs

Instructions

1) Figures to the right indicate full marks
2) Assume suitable data if necessary

1) Attempt any two of the following {4x2 =8}
   a) Define the productions and productivity .
   b) Define the terms, fixed cost and variable cost.
   c) Draw a Break- even chart and indicate on it Break even point.

2) Attempt any two of the following (7x2=14)
   a) State different type of material handling equipments used in industry. Explain any of with neat Sketch.
   b) What do you mean by plant? State its Objectives.
   c) i) State four symptoms of good plant layout.
      ii) Discuss the principles of material handling.

3) Attempt any two of the following. [7x2=14]
   a) What is process planning? What are the factors affecting process planning.
   b) What is operation sheet? How Selection of machine is done?
   c) What are the different types of assembly?

4) Attempt any two of the following [5x2=10]
   a) What do you mean by line balancing?
   b) What is meaning of control?
   c) What is Sequencing?

5) Attempt any two of the following [8x2=16]
   a) Explain in brief, string diagram and How Process chart?
   b) What is standard time? How it is calculated?
   c) What is predetermined motion time study? What do you mean by work Something?

6) a) The annual requirement of a company is 8000 parts. The cost of each part is Rs 60. The ordering cost per order is Rs 150. The carrying cost is 30% of the average inventory per year. Determine the EOQ (Economic Order Quantity) [10]

   OR

   What do you mean by storage system. Explain any one of Storage System?
   b) Explain methods of Inventory management. [4]

7) Attempt any one of two following [8x1=8]
   a) State and explain different types of locators and clamping devices used in fixture.
   b) Discuss the 3-2-1 Principle of location with neat diagram.

8) Attempt any two of the following [8x2=16]
   a) Discuss the concept of the following practices
      I. Kaizen
      II. Flexible Manufacturing System (FMS)
   b) What is '5-s'? What is meaning of each term associated with it?
   c) Explain lean manufacturing in brief.

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DIPLOMA 6TH SEMESTER EXAMINATION 2021

Subject : Refrigeration & Air Conditioning (Elective-II) **Full Marks : 80**
Subject Code : MEC 608 **Pass Marks : 26**
Time ; 3hrs

Answer any five questions. Each question carry equal marks.
Question No. 1 is Mandatory.

1. Choose the correct answer from the followings: 8×2=16

(a) Ratio of refrigerating effect to the work supplied is called
(i) C.O.P (ii) E.P.R (iii) Efficiency (iv) Relative C.O.P

(b) In a refrigeration cycle the flow of refrigerant is controlled by
(i) Compressor (ii) Expansion valve (iii) Condenser (iv) Evaporator

(c) I tonne of refrigeration is equal to
(i) 620 KJ/min (ii) 420 KJ/min (iii) 210 KJ/min (iv) 21KJ/min

(d) A bell Cole moon cycle is
(i) Reversed Atkinson cycle (ii) Reversed Joule Cycle
(iii) Reversed Carnot Cycle (iv) Reversed Brayton cycle

(e) The boiling point of ammonia is
(i) -10.5^0C (ii) -30^0C (iii) -33.3^0C (iv) -77.7^0C

(f) A reversible engine has ideal thermal efficiency of 30% when it is used as a refrigerating machine with other condition unchanged, the C.O.P will be
(i) 1.33 (ii) 2.33 (iii) 3.33 (iv) 4.33

(g) Rating of domestic refrigerator is of the order of
(i) 0.1 ton (ii) 5 tons (iii) 10 tons (iv) 40 tons

(h) A human body feels comfortable when the heat produced by the metabolism of human body is equal to the
(i) Heat dissipated to the surroundings (ii) Heat stored in the human body
(iii) Sum of (i) and (ii) (iv) difference of (i) and (ii)

2. Explain the methods of refrigeration also write five applications of refrigeration. 16

3. What is reversed Carnot cycle? Represent reversed Carnot cycle on P-V and T-S diagram. Also give reason that why this cycle is not feasible? 16

4. Compare vapour compression refrigeration system and vapour absorption refrigeration system? Also explain Green House Effect, Ozone depletion and Global warming. 16

5. Write selection criteria for vapour compression refrigeration system components for the following applications: 16
(a) Water Coolers (b) Ice Plants
(c) Cold Storage (d) Domestic refrigerator

6. Explain in details industrial and commercial A.C system? Also write application areas of A.C system. 16

7. What are purpose of Insulations? Write properties, purpose and application of Insulating materials? 16

8. Write short notes of any Four: 16
(a) Central and unitary A.C system
(b) Adiabatic Mixing of Air Streams
(c) Desirable properties of Refrigerants
(d) Nomenclature of Refrigerants
(e) Dry expansion chillers and flooded chillers
(f) Psychrometric chart

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