Seventh Semester B.E. Degree Examination, Aug./Sept. 2020
Hydraulics and Pneumatics

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1   a.   With neat block diagram, explain the structure of hydraulic power system. **(06 Marks)**
     b.   Explain the construction and working of balanced vane pump. **(08 Marks)**
     c.   A Hydraulic pump has a displacement volume of 120cm³. Its actual flow rate is 0.0015 m³/s at 900 rpm and 75 bar. If the actual torque input by the Prime mover to the pump is 150N-m, determine the overall efficiency of the pump. Also find the theoretical torque input to the pump for its operation. **(06 Marks)**

2   a.   With a neat sketch, explain the second class lever system used with hydraulic cylinders to drive load. **(06 Marks)**
     b.   Explain with neat sketch the operation of swash plate Piston motor in hydraulic system. **(06 Marks)**
     c.   A hydraulic motor has a displacement of 165cm³/rev, and operates with a pressure of 70 bar and a speed of 2000rpm. If the actual flow rate consumed by the rotor is 6 liters/s and the actual torque delivered by the motor is 170 N-m, find
          i)   Volumetric efficiency of the motor
          ii)   Mechanical efficiency of the motor
          iii)   Overall efficiency of the motor
          iv)   Actual Power (kw) delivered by the motor. **(08 Marks)**

3   a.   Classify Hydrulic control valves, explain with a neat sketch pressure compensated flow control valve. **(10 Marks)**
     b.   Draw symbolic representation of the following hydraulic control valves.
          i)   Simple pressure relief valves
          ii) Pressure reducing valve
          iii) Sequence valve
          iv) Counter balance valve
          v) Manually operated, spring centered three position four way valves. **(10 Marks)**

4   a.   Explain with a neat circuit diagram the working of a regenerative circuit. **(08 Marks)**
     b.   Explain with a neat Meter – in circuit diagram the working of a speed control of hydraulic cylinder. **(08 Marks)**
     c.   What are hydraulic accumulators? Classify the accumulators used in hydraulic system. **(04 Marks)**

PART – B

5   a.   Explain any five desirable properties of hydraulic fluid. **(10 Marks)**
     b.   Explain three types of filtering methods adopted in hydraulic system. **(06 Marks)**
     c.   What are the effects of solid contamination? **(04 Marks)**

6 a. Explain the characteristics of compressed air. (06 Marks)

b. Define Pneumatic system. Give the difference between hydraulic and pneumatic system. (06 Marks)

c. Explain end position cushioning in pneumatic cylinder with diagram. (08 Marks)

7 a. Explain with a neat sketch sequence control of two double acting cylinder using logic gates. (10 Marks)

b. Explain the following logic gates used pneumatic logic operations.
i) AND   ii) OR   iii) NOT   iv) NOR   v) NAND. (10 Marks)

8 a. Explain with a neat diagram coordinated sequence motion of two cylinders. (10 Marks)

b. Write a short notes on :
i) Airfilters   ii) Air Dryers   iii) Air lubricator. (10 Marks)

* * * * *

Seventh Semester B.E. Degree Examination, Aug./Sept.2020
Operations Research

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Name and explain any three applications of LPP in OR. **(04 Marks)**
   b. Obtain the graphical solution to the given LPP.
      Minimize $Z = 5x + 10y$
      Subject to $x + 2y \leq 120$
      $\qquad\qquad x + y \geq 60$
      $\qquad\qquad x - 2y \geq 0$ **(06 Marks)**
   c. The manager of an oil refinery must decide on the optimal mix of 2 possible bending process of which the input for production run as follows:

Process	Inputs (units)		Output (units)	
	Crude-A	Crude-B	gasoline-X	gasoline-Y
1	5	3	5	8
2	4	5	4	4

The maximum crude available is 200 units of Type 'A' and 150 units of type 'B'. The market requirement is that atleast 100 units of gasoline-X and gasoline-Y must be produced. The estimated profit from production run of process-1 and 2 are Rs.300 and Rs.400. Formulate the problem and solve by graphical method. **(10 Marks)**

2 a. Explain Artificial variables with an example. **(04 Marks)**
   b. Convert the following LPP to dual form.
      Minimize $Z = 2x_1 + x_2 + 3x_3$
      Subject to $x_1 - 3x_2 + 4x_3 = 5$
      $\qquad\qquad 2x_1 - x_2 \leq 3$
      $\qquad\qquad 2x_2 - x_3 \geq 5$
      $x_1, x_2 \geq 0$ and x_3 is unrestricted. **(06 Marks)**
   c. Solve the given LPP using simplex method:
      Maximize $Z = 3x_1 + 5x_2 + 4x_3$
      Subject to $x_2 + 2x_3 \leq 6$
      $\qquad 3x_1 + 2x_2 + x_3 \leq 18$
      $\qquad\qquad x_1, x_2, x_3 \geq 0$ **(10 Marks)**

3 a. A company has four factories A, B and C which supply warehouses D, E, F and G. Monthly factory capabilities are 160, 150 and 190 units respectively. Monthly requirements are 80, 90, 110 and 160 units respectively. Unit shipping costs are as follows. Formulate the problem and get the initial solution by VAM method. **(12 Marks)**

Destination Origin	D	E	F	G
A	42	48	38	37
B	40	49	52	51
C	39	38	40	43

b. Four machines to be assigned to four jobs. The cost matrix is given as follows. Find the proper assignment and total cost by Hungarian method. **(08 Marks)**

Machine / Job	A	B	C	D
1	8	10	17	9
2	3	8	5	6
3	10	12	11	9
4	6	13	9	7

4 a. Explain the Branch and Bound method for Integer Programming. **(05 Marks)**

b. Find the solution to the given LPP using Gomory's fractional cut technique.

Maximize $Z = x_1 + x_2$

Subject to $3x_1 + 2x_2 \le 5$

$x_2 \le 2$

x_1 and $x_2 \ge 0$ are integers. **(15 Marks)**

PART – B

5 a. For the following (i) Draw Activity on arrows (ii) Find Total Float and Free Float.

Activity	A	B	C	D	E	F	G	H	I	J
Predecessor	-	-	A	B	C	C	E	F, D	H, G	I
Time	10	8	8	16	7	7	10	12	8	5

(10 Marks)

b. Crash the following project activities and find :
(i) Normal project duration and cost
(ii) Optimum project duration and cost after crashing **(10 Marks)**

Activity		1 – 2	1 – 3	2 – 4	3 – 4
Normal	Time	8	4	2	5
	Cost	100	150	50	100
Crash	Time	6	2	1	1
	Cost	200	350	90	200

6 a. Explain queuing system. Also list and explain queue disciplines. **(05 Marks)**

b. In a railway yard, goods trains arrive at a rate of 30 trains/day. Assuming inter arrival time follows an exponential distribution and service time also an exponential distribution with an average 36 minutes, calculate the following:
(i) The mean queue size
(ii) The probability the queue size exceeds 10
If the input of trains increases to an average of 33 trains/day, what will be the change in (i) and (ii)? **(10 Marks)**

c. What is Traffic Intensity and its unit? **(05 Marks)**

7 a. Explain the theory of dominance in a Game. **(04 Marks)**

b. Obtain optimal strategies for both persons and value of the game for two persons zero sum game whose pay off matrix as follows:

Player – B

$$
\begin{array}{c}
\text{Player } -A
\end{array}
\begin{array}{c}
 & B_1 & B_2 \\
A_1 & 1 & -3 \\
A_2 & 3 & 5 \\
A_3 & -1 & 6 \\
A_4 & 4 & 1 \\
A_5 & 2 & 2
\end{array}
$$

(08 Marks)

c. Two players A and B play a game in which each has three coins 5p, 10p and 20p. Each player selects the coin without the knowledge of other player. If sum of the coin is an odd number then 'A' with 'B's coin and if sum of the coin is an even number then B with A's coin. Find the strategy of each player and the value of the game. **(08 Marks)**

8 a. A machine operator has to perform three operations on number of different jobs. Determine the order of job and total elapsed time (hrs) with idle time of machines.

Jobs

Machines ↓	1	2	3	4	5	6
Turning (A)	5	14	7	4	11	13
Threading (B)	10	8	6	8	5	3
Knurling (C)	15	16	11	14	10	15

(10 Marks)

b. Find the optimum sequence of 2 jobs on 'M' machine (5 machines) using graphical method:

Job 1	Sequence	A	B	C	D	E
	Time	3	4	2	6	2
Job 2	Sequence	B	C	A	D	E
	Time	5	4	3	2	6

(10 Marks)

* * * * *

Seventh Semester B.E. Degree Examination, Aug./Sept.2020
Total Quality Management

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1　a. Describe the term TQM and its Basic approach.　　　　　　　　**(08 Marks)**
　　b. Mention the list of TQM Gurus and discuss their contributions.　**(07 Marks)**
　　c. Mention the benefits of TQM Implementation in an organization.　**(05 Marks)**

2　a. Define Leader and explain the seven habits of Highly effective people.　**(08 Marks)**
　　b. Enumerate Deming's philosophy or 14 points of management and explain any four of them.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(08 Marks)
　　c. Explain the role of leadership in decision making in an organization.　**(04 Marks)**

3　a. Who is Customer? And explain Customer perception of quality.　**(08 Marks)**
　　b. Define Team and explain types of Team and role of Team members.　**(08 Marks)**
　　c. Write a note on Gain sharing in an Organization.　　　　　　**(04 Marks)**

4　a. Explain Juran Triology with a neat sketch.　　　　　　　　　**(10 Marks)**
　　b. Write a note on following : i) PDSA　　ii) Kaizen.　　　　**(10 Marks)**

PART - B

5　a. Explain how the following management tools used for problem identification and solving in an organization with an example.
　　　i) Forced Field Analysis　　　ii) Nominal Group Techniques.　**(10 Marks)**
　　b. Write a note on following Management Tools :
　　　i) Matrix diagram　　　　　ii) Activity diagram.　　　　**(10 Marks)**

6　a. Explain how the following Quality Control tools are used in an organization, with an example : i) Cause and effect diagram　　ii) Control charts.　**(10 Marks)**
　　b. Write a short notes on following Statistical Process (SPC) Tools with an example :
　　　i) Flow charts or process chart.
　　　ii) Histogram and Pareto diagram.
　　　iii) Scatter diagram.　　　　　　　　　　　　　　　　　**(10 Marks)**

7　a. Enumerate a note on Implementation of ISO – 9000 series.　　**(10 Marks)**
　　b. Describe the problems associated by an organization in making Commitment to TQM.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(10 Marks)

8　a. What do you mean by six sigma and mention features and approach of Design for Six Sigma (DFSS)?　　　　　　　　　　　　　　　　　　　　　　**(08 Marks)**
　　b. Explain following six sigma tools :
　　　i) Tools for concept or idea development.
　　　ii) Tools for Design development.　　　　　　　　　　　　**(12 Marks)**

*****

USN | | | | | | | | | | |

10ME762

Seventh Semester B.E. Degree Examination, Aug./Sept. 2020
Tools Design

Time: 3 hrs.

Max. Marks:100

Note: *Answer FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1 a. What is tooling? Briefly explain tool design procedure. **(06 Marks)**
   b. Determine single point cutting tool design consideration for strength and rigidity for rectangular, square and circular cross section. **(08 Marks)**
   c. Define chip breaker. Explain different types of chip breakers with suitable sketch. **(06 Marks)**

2 a. Sketch and explain twist drill construction. **(10 Marks)**
   b. Explain with sketch the following elements with respect to design of milling cutter.
      i) Number of teeth
      ii) Height circular pitch
      iii) Body thickness
      iv) Chamfer width
      v) Fillet radius. **(10 Marks)**

3 a. Differentiate between Jigs and Fixtures. List the advantages of Jigs and Fixtures in mass production. **(06 Marks)**
   b. With a neat sketch, explain diamond pin locator and conical locator. **(06 Marks)**
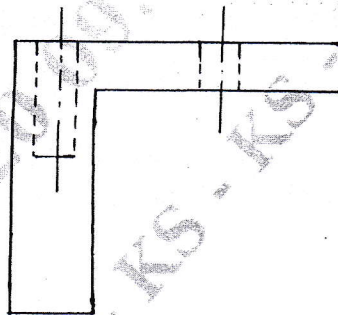   c. Design a typical drilling Jig for drilling holes in an following angle plate component. Refer Fig.Q3(c).

Fig.Q3(c) **(08 Marks)**

4 a. With sketch explain, Collects and Mandrels used in Fixtures. **(06 Marks)**
   b. Explain the essential factors to be considered for designing milling fixtures. **(06 Marks)**
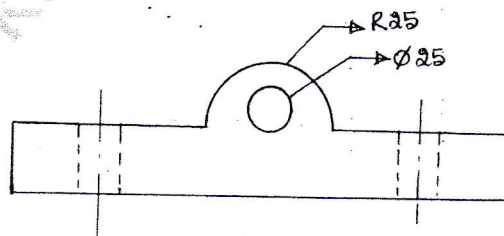   c. Design a turning fixture to bore φ25mm for the following component. Refer Fig.Q4(c).

Fig.Q4(c) **(08 Marks)**

PART – B

5   a. Define press? While electing a press what are the points should be considered?   **(06 Marks)**
    b. List out different press tool operations and explain any two with a sketch.   **(06 Marks)**
    c. Two holes, one 4cm square and another of 6cm diameter are to be cut in a metallic sheet 3mm thick. If shear strength of material is 2500kg/cm^2.
        Determine :
        i)   Cutting force
        ii) Stripping force.   **(08 Marks)**

6   a. Explain the following :
        i)   Edge bending
        ii) V – Bending
        iii) U – Bending.   **(06 Marks)**
    b. List and explain factors affecting drawing operation.   **(06 Marks)**
    c. A drawn steel shell has an outside diameter of 70mm and is made from 2.4mm thick sheet having 2300kg/cm^2 yield strength. If blank diameter is 136mm, calculate :
        i)   Dimensions of punch and die
        ii) Drawing force.   **(08 Marks)**

7   a. Define die casting. List out the different type of die casting dies. Explain any two with sketch.   **(08 Marks)**
    b. What are the good requirements of die casting alloys? Explain high fusion and low fusion alloys used in die casting process.   **(06 Marks)**
    c. Explain with necessary sketch, cold type and hot type die casting defects.   **(06 Marks)**

8   a. Explain injection modeling machine with sketch.   **(08 Marks)**
    b. With a neat sketch, explain transfer modeling process.   **(06 Marks)**
    c. Explain calendaring process with sketch.   **(06 Marks)**

* * * * *