

USN

--	--	--	--	--	--	--	--	--	--

06ME72

**Seventh Semester B.E. Degree Examination, June 2012**  
**Computer Integrated Manufacturing**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. What is automation? Discuss the classification with features. (10 Marks)
- b. Briefly explain the following terms:
 

i) Manufacturing lead time	ii) Production rate
iii) Utilization and availability	iv) Work in process.

 (10 Marks)
  
- 2 a. List the objectives of automated flow line. (04 Marks)
- b. Sketch and explain the following transfer mechanisms:
 

i) Roller chain drive	ii) Ratchet and Pawl mechanism
-----------------------	--------------------------------

 (10 Marks)
- c. Discuss the control functions used in an automated flow line. (06 Marks)
  
- 3 a. Differentiate between the upper bound and lower bound approach to analyse automated flow lines without storage buffers. (08 Marks)
- b. Discuss the starving and blocking of stations with respect to an automated flow line. (04 Marks)
- c. Compare on the basis of cost per unit and suggest whether the performance of ten station transfer line having six automated and four manual station with an automated station. Cost data for the existing line:
 

i) $C_m = \text{Rs. } 0.50/\text{unit.}$	ii) $T_c = 30 \text{ seconds}$	iii) $C_o = \text{Rs. } 0.15/\text{min}$
iv) $C_{as} = \text{Rs. } 0.10/\text{min}$	v) $C_{at} = \text{Rs. } 0.10/\text{min}$	vi) $C_t = \text{Rs. } 0.08/\text{min}$

 The proposed automated station would allow the cycle time to be reduced to 24 seconds with added cost at Rs.0.25/min. Probability of breakdown for six stations  $P = 0.01$  and estimated probability for new station  $P = 0.02$  with downtime of 3 min. which is unaffected. (08 Marks)
  
- 4 a. Explain the following terms in line balancing:
 

i) Cycle time	ii) Precedence constraints	iii) Precedence diagram	iv) Balance delay.
---------------	----------------------------	-------------------------	--------------------

 (08 Marks)
- b. For a new product the precedence relationship and element times are as per the following data:

Element	$t_c$ (min)	Immediate predecessor
1	1.0	-
2	0.5	-
3	0.8	1, 2
4	0.3	2
5	1.2	3
6	0.2	3, 4
7	0.5	4
8	1.5	5, 6, 7

Using the largest candidate rule method,

- i) Construct the precedence diagram for this product.
- ii) Find the number of stations required if the cycle time is 1.5 min
- iii) Compute the balance delay.

(12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. Illustrate elements of the parts delivery in automatic assembly system. (10 Marks)  
b. Discuss the functions that are performed while operating automated guided vehicle system. (10 Marks)
- 6 a. Explain with figure the two approaches of CAPP system. (10 Marks)  
b. What is material requirement planning? Explain the structure of MRP system. (10 Marks)
- 7 a. What are the elements of CNC system? List the salient features. (10 Marks)  
b. Discuss the fundamental steps involved in development of parts programming for milling in CNC system. (10 Marks)
- 8 a. Sketch and explain the robot configurations. (12 Marks)  
b. Define resolution, accuracy and repeatability, as applied to robots. (08 Marks)

\* \* \* \* \*

SKIT LIBRARY

USN

--	--	--	--	--	--	--	--	--	--

06ME73

**Seventh Semester B.E. Degree Examination, June 2012**  
**Manufacturing Process – III**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Explain the classification of metal forming process based on the working temperature. (06 Marks)
- b. Mention the advantages of using true stress-strain diagram in plasticity (07 Marks)
- c. With neat sketches, explain the Bi-axial and Tri-axial stress systems. (07 Marks)
- 2 a. Discuss the various theories regarding friction in metal working. (08 Marks)
- b. Explain the deformation zone geometry. (06 Marks)
- c. Explain the effect of strain rate on the metal working process. (06 Marks)
- 3 a. Mention the advantages and disadvantages of forging. (08 Marks)
- b. Discuss the various forging design parameters. (06 Marks)
- c. A flat circular disk of 25mm diameter and thickness 75mm is to be forged to half the height between flat faces. Calculate the maximum forging head. Take  $\mu = 0.4$  and yield stress of material as  $40 \text{ kN/mm}^2$ . (06 Marks)
- 4 a. Discuss the effect of back and front tensions on rolling pressure. (08 Marks)
- b. With neat sketches, explain the defects in rolled products. (06 Marks)
- c. A strip is given 20% reduction in thickness by rolling operation. If its final thickness is 5mm and roll radius is 500mm, determine the position of the neutral plane. Take  $\mu = 0.2$  and assume the plain strain condition for rolling. (06 Marks)

**PART – B**

- 5 a. Derive an expression for drawing load. (08 Marks)
- b. Explain the steps in tube drawing process. (06 Marks)
- c. With neat sketches, explain any three methods of tube drawing. (06 Marks)
- 6 a. Explain the various types of extrusion processes, with a neat sketch. (08 Marks)
- b. Explain the extrusion tooling assembly. (06 Marks)
- c. Briefly explain defects in the extrusion process. (06 Marks)
- 7 a. Explain the various types of dies. (08 Marks)
- b. Write short notes on:
  - i) Stretch forming
  - ii) Bulging
  - iii) Coining
  - iv) Rubber forming.
 (12 Marks)
- 8 a. Explain the electrohydraulic forming, with a neat sketch. (06 Marks)
- b. Mention the advantages and disadvantages of powder metallurgy. (08 Marks)
- c. Discuss the various methods of production of powder. (06 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

## Seventh Semester B.E. Degree Examination, June 2012

### Operations Research

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.  
2. Use of normal distribution tables is permitted.**

#### PART – A

- 1 a. Define operations research and briefly explain the phases of OR. (05 Marks)  
b. ABC company owns a paint factory that produces both exterior and interior paints for wholesale distribution. The basic raw materials A and B are used to manufacture the paints. The maximum availability of A is 6 tonne/day and that of B is 8 tonne/day. The requirements of raw materials/tonne of interior and exterior paints are given below :

Raw material	Exterior paint	Interior paint
A	1	2
B	2	1

Market survey has established that the daily demand for interior paint cannot exceed that of exterior paint by more than 1 tonne. The survey also shows that max demand for interior paint is limited to 2 tonnes/day. The wholesale price/tonne is Rs.3000 for exterior and Rs.2000 for interior paint. How much interior and exterior paint the company should produce to maximize the gross income. Formulate the above data as a LPP and solve graphically. (15 Marks)

- 2 a. Explain the condition of inconsistency and redundancy in LPP. (05 Marks)  
b. Show that both the Primal and the dual of the following LPP have the same optimal 'Z' and the solution can be read from the Primal solution :  
Maximize  $Z = 2x_1 + x_2$   
Subject to constraint  $x_1 + 5x_2 \leq 10$ ;  $x_1 + 3x_2 \leq 6$ ;  $2x_1 + 2x_2 \leq 8$ ,  $x_1, x_2 \geq 0$  (15 Marks)
- 3 a. Differentiate between transportation and assignment models. (05 Marks)  
b. Goods are to be shipped from three warehouses  $W_1, W_2$  and  $W_3$  to six customers  $C_1, C_2, C_3, \dots, C_6$ . The availabilities at the warehouses are 100, 120 and 150 units respectively while the demands of customers are 50, 40, 50, 90, 60 and 80 respectively. The unit costs of transportation are as given in the following table. Is it possible to have more than one optimal solution? (15 Marks)

		Customers					
		$C_1$	$C_2$	$C_3$	$C_4$	$C_5$	$C_6$
Warehouses	$W_1$	15	25	18	35	40	23
	$W_2$	22	36	40	60	50	38
	$W_3$	26	38	45	52	45	48

- 4 a. A bookbinder has one printing machine, one binding machine and one finishing machine. The time in minutes required for printing, binding and finishing operations for each book are known. Determine the order in which the books should be processed in order to minimize the total time required to process all the jobs. Also find the total elapsed time and idle time.

Book	1	2	3	4	5
Printing time	40	90	80	60	50
Binding time	50	60	20	30	40
Finishing time	80	100	60	70	110

(10 Marks)

- 4 b. Determine the minimum elapsed time for completing following two jobs. Details of processing times and the sequence of operations are given below :
- Job 1 : A – 4 to C – 2 to D – 6 to E – 3 to B – 2
- Job 2 : C – 8 to A – 3 to D – 4 to B – 2 to E – 3
- Also determine the sequence of jobs on each machine. (10 Marks)

**PART – B**

- 5 a. List the basic characteristics of queue. (05 Marks)
- b. A public telephone booth is in a post office. The arrivals are considered to be Poisson’s with an average inter arrival time of 12 minutes. The length of the phone call is assumed to be exponentially distributed with an average of 4 minutes, calculate the following :
- What is the probability that fresh arrival will not have to wait for the phone?
  - What is the probability that an arrival will have to wait more than 10 minutes before the phone is free?
  - What is the average length of the queue that forms time to time?
  - What is the probability of finding more than 5 customers in the system? (15 Marks)
- 6 a. A project consists of the following activities with their precedence relationship and duration in days:
- Draw the network of the project
  - Identify the critical path and project duration
  - Calculate EST, EFT, LST, LFT, TF, FF and IF for each activity.

Activity	A	B	C	D	E	F	G	H
Precedence	-	A	A	B	B	BC	BC	DF
Duration (in days)	10	8	7	9	6	10	4	12

(10 Marks)

- b. A project is composed of 7 jobs whose time estimations are given below :

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Most likely time	7	16	7	9	20	14	2
Optimistic time	8	18	9	10	24	16	3
Pessimistic time	9	20	11	11	28	18	4

- Draw the network and calculate the length and variance along the critical path
- Find the probability of completing the project one day earlier and 2 days later. (10 Marks)

- 7 a. Solve the following ( 2 × 4 ) game by graphical method, table Q7(a) (08 Marks)

		Player B			
		I	II	III	IV
Player A	I	2	1	0	-2
	II	1	0	3	2

Table.Q7(a)

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	3	2	4	0
	A <sub>2</sub>	3	4	2	4
	A <sub>3</sub>	4	2	4	0
	A <sub>4</sub>	0	4	0	8

Table.Q7(b)

- Solve the game by principle of dominance, table Q7(b). (08 Marks)
- Define the following : (04 Marks)
  - Saddle point
  - Pure strategy
  - Mixed strategy
  - Two persons zero sum game

- 8 a. Explain the methods used in integer programming problems. (04 Marks)
- b. Solve the following integer programming problem by Gomory technique :
- Maximize  $Z = x_1 + x_2$
- Subject to constraints  $3x_1 + 2x_2 \leq 12$ ,  $x_2 \leq 2$ ,  $x_1, x_2 \geq 0$  and integers. (16 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

06ME758

**Seventh Semester B.E. Degree Examination, June 2012**  
**Total Quality Management**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Define quality. What is total quality management? Write its basic concepts. (08 Marks)  
b. Write the obstacles of implementation of TQM. (08 Marks)  
c. List the dimensions of quality, with example and how to measure. (04 Marks)
- 2 a. Explain the contributions of quality gurus to the modern management philosophy. (08 Marks)  
b. What is Taguchi's loss function? Explain with a sketch of loss versus quality characteristics curve. (08 Marks)  
c. With an example, explain the Ishikawa diagram. (04 Marks)
- 3 a. Define leadership and explain seven habits of effective people. (08 Marks)  
b. What is strategic planning? Enumerate the steps to strategic planning. (08 Marks)  
c. With an example, explain the vision and mission statements. (04 Marks)
- 4 a. What is quality cost? Write and explain its categories and elements. (10 Marks)  
b. Explain reactive and proactive improvement with its standard steps and 7 tools of quality. (10 Marks)

**PART – B**

- 5 a. What is KAIZEN? Explain the usefulness of Kaizen in continuous improvement of an organization. (08 Marks)  
b. Define benchmarking and write the process involved in benchmarking. (08 Marks)  
c. Explain Poka – Yoke with an example. (04 Marks)
- 6 a. What is QFD? How it is useful when a new product is developed? (08 Marks)  
b. What is meant by FMEA? Write the four main stages of FMEA. (08 Marks)  
c. Explain in brief quality by design. (04 Marks)
- 7 a. Explain the steps that are necessary to implement a quality management system. (10 Marks)  
b. What is documentation? Explain the system documentation containing 4 tiers with a pyramid. (10 Marks)
- 8 Write short notes on :  
a. Six sigma quality standard  
b. 5 S of Japanese management  
c. Acceptance sampling  
d. OC curve for an ideal situation. (20 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

USN

--	--	--	--	--	--	--	--	--	--

06ME763

## Seventh Semester B.E. Degree Examination, June 2012

### Internal Combustion Engines

Time: 3 hrs.

Max. Marks:100

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

#### PART – A

- 1 a. Explain with the help of p-v diagram, the loss due to variation of specific heats in an Otto cycle. (06 Marks)
- b. Mention the simplified assumptions used in fuel-air cycle analysis. (04 Marks)
- c. The air-fuel ratio of diesel is 29:1. If the compression ratio is 16:1 and the temperature at the end of compression is 900 K, find at what cylinder volume the combustion is complete. Express this volume as a percentage of stroke. Take C.V. of fuel as 42 MJ/kg,  $R = 0.287 \text{ kJ/kgK}$  and  $C_v = 0.709 + 0.000028 T \text{ kJ/kgK}$ . (10 Marks)
- 2 a. Explain the phenomenon of knock in S.I. engines. Also explain the effect of various engine variables on S.I. engine knock. (10 Marks)
- b. Sketch and explain in brief the working of simple carburetor. (06 Marks)
- c. Write a short note on pre-ignition, and HUCR values. (04 Marks)
- 3 a. Explain with a P- $\theta$  diagram the four stages of combustion in C.I. engines. (08 Marks)
- b. Define delay period. Explain the effect of various factors on delay period. (08 Marks)
- c. Write a note on "CETANE NUMBER". (04 Marks)
- 4 a. With sketch explain I – head and F-head S.I. engine combustion chambers. (10 Marks)
- b. With sketch, explain in brief air-cell and M-combustion chamber in C.I. engines. (10 Marks)

#### PART – B

- 5 a. Explain the four main crude-petroleum chemical structures. (08 Marks)
- b. Explain the advantages and disadvantages of alcohols. (06 Marks)
- c. Discuss suitability of alternative fuels in diesel engines. (06 Marks)
- 6 a. What are the functions of Nozzle? Draw the sketches of two Nozzles. (06 Marks)
- b. With sketch explain the thermosyphon cooling system. (07 Marks)
- c. With a sketch, explain electronic fuel injection system in I.C. engines (any one). (07 Marks)
- 7 a. What are supercharging and turbo charging? Also write the effect of supercharging on :  
i) Power output      ii) Mech efficiency and      iii) Fuel consumption. (10 Marks)
- b. With a sketch, explain rotary-piston engine. (06 Marks)
- c. Explain multifuel engines. (04 Marks)
- 8 a. Explain the mechanism of formation of the pollutants like carbon monoxide [CO] oxides of Nitrogen (NO<sub>x</sub>) in S.I. engines. (06 Marks)
- b. What is meant by total emission control package? Describe with a sketch, the catalytic converter package. (08 Marks)
- c. Explain the effect of pollution from S.I. and C.I. engines on the atmosphere. (06 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.