177 : 2nd Half-Exam-10-DD (A).

Con. 6493-10. (REVISED COURSE) **GT-3639**

(2 Hours) [**Total Marks : 50**

N.B. (1) Question No. **1** is **compulsory**.
   (2) Attempt any **four** questions from question Nos. **2** to **7**.

1. Solve any **five** :—   10
   (a) What is acid rain ? Give two effects of acid rain.
   (b) Differentiate between Bioprospecting and Biopiracy.
   (c) Write note on Cyclone Mitigation.
   (d) Name the fundamental principles of the environment.
   (e) Distinguish between Nuclear Fission and Nuclear Fussion.
   (f) Explain the term Sustainable Development.

2. (a) Give an account of Women and Child Welfare in India.   5
   (b) Discuss the causes and effect of Global Warming.   5

3. (a) Discuss the effect of Water Pollution.   5
   (b) Discuss the role of information technology in environment and human health.   5

4. (a) Short note on public awareness about the environment.   5
   (b) Explain Soil Errosion. How it happened give its types.   5

5. (a) What is Noise ? Describe briefly the effect of noise on human health.   5
   (b) Write an essay on Disaster Management.   5

6. (a) Give the effect of deforestation.   5
   (b) Describe the grassland and forest ecosystem.   5

7. (a) Give the fifteen principles of Environmental Education.   5
   (b) Explain the benefits of biological diversity.   5

Applied mathematics IV   GT-6939

Con. 5641-10.

(OLD COURSE)

(3 Hours)   [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**.
  (2) Attempt any **four** questions out of the remaining **six** questions.
  (3) **Figures** to the **right** indicate **full** marks.
  (4) Use of statistical table is **permitted**.

1. (a) A problem in statistics is given to 5 students A, B, C, D and E. Their chances **5**
    of solving it are 1/2, 1/3, 1/4 1/5 and 1/6. What is the probability that the
    problem will be solved ?

  (b) Comment on the following :   **5**
      For a bivariate distribution,
        (i) $b_{xy} = 2.8$, $b_{yx} = -0.3$
        (ii) $b_{xy} = -0.8$, $b_{yx} = -1.2$, $r_{xy} = 0.98$

  (c) With usual notations, find P of Binomial distribution if—   **5**
    $n = 6$, and $9P(x = 4) = P(x = 2)$.

  (d) Find the expectation of number of failures preceeding the first success in   **5**
    an infinite series of independent trials with constant probabilities p and q of
    success and failure respectively.

2. (a) A random variable X has the following probability distribution :   **6**

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

    (i)   Find k
    (ii) Evaluate $P(3 < x \le 6)$
    (iii) Find the minimum value of x so that $P(x \le x) > 1/2$.

  (b) In a normal distribution, 7% of the items are under 35 and 89% are under   **6**
    63. What are the mean and standard deviation of the distribution ?

  (c) Use simple method to   **8**
        Maximise $Z = 4x_1 + 3x_2 + 4x_3 + 6x_4$
        Subject to the constraints
            $x_1 + 2x_2 + 2x_3 + 4x_4 \le 80$
            $2x_1 + 2x_3 + x_4 \le 60$
            $3x_1 + 3x_2 + x_3 + x_4 \le 80$
            $x_1, x_2, x_3, x_4 \ge 0$.

3. (a) Find the two regression equations for the following two series. What is the **6** most likely value of X when—

$Y = 20$; and of Y when $X = 22$.

X	35	25	29	31	27	24	33	36
Y	23	27	26	21	24	20	29	30

(b) In a cross-breeding experiment with plants at certain species 240 offsprings **6** were classified into 4 classes with respect to the structure of their leaves as follows :

Class	I	II	III	IV
Frequency	21	127	40	52

According to the theory of heredity, the probability of the four classes should be in the ratio $1 : 9 : 3 : 3$. Are these data consistant with theory ?

(c) Using the method of Lagrangean multipliers, solve the following non-linear **8** programming problem.

Maximise $Z = 6x_1 + 8x_2 - x_1^2 - x_2^2$

Subject to $4x_1 + 3x_2 = 16$

$3x_1 + 5x_2 = 15$

$x_1, \quad x_2, \quad \geq 0$

[TURN OVER

4. (a) 10 persons were appointed in the electrical positions in an office. Their   **6**
performance was noted by giving a test and the marks recorded out of 50.
They were given 6 months training and again they were given a test and
marks were recorded out of 50.

Employees	A	B	C	D	E	F	G	H	I	J
Before training	25	20	35	15	42	28	26	44	35	48
After training	26	20	34	13	43	40	29	41	36	46

By applying t-test, can it be concluded that employees have benefitted by   **6**
training ?

(b) You are given the following information relating to a frequency distribution
comprising 10 observations :

$$\bar{x} = 5 \cdot 5, \quad \bar{y} = 4 \cdot 0, \quad \sum x^2 = 385, \quad \sum y^2 = 192 \quad \sum (x+y)^2 = 947.$$

Find r_{xy}.

(c) Using the Kuhn-Tucker conditions, solve the following NLPP.   **8**

Minimimise $Z = 7x_1^2 + 5x_2^2 - 6x_1$

Subject to $x_1 + 2x_2 \geq 10$

                    $x_1 + 3x_2 \geq 9$

                    $x_1, x_2 \geq 0$

5. (a) Using graphical method, solve the following LPP   **6**

Maximise $Z = 7x_1 + 3x_2$

Subject to $x_1 + 2x_2 \geq 3$

                 $x_1 + x_2 \leq 4$

                 $0 \leq x_1 \leq 5/2$

                 $0 \leq x_2 \leq 3/2$

(b) Find the mean and variance of Binomial distribution.   **6**

(c) Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per   **8**
gram and costs 12 paise per gram. Food Y contains 8 units of Vitamin A
per gram and 12 units of Vitamin B per gram and costs 20 paise per gram.
The daily minimum requirements of Vitamin A and B are 100 units and 120
units respectively. Find the minimum cost of production.

6. (a) Use the dual simplex mehod to solve the following LPP   **6**

Minimise $Z = 6x_1 + 3x_2 + 4x_3$

Subject to $x_1 + 6x_2 + x_3 = 10$

                 $2x_1 + 3x_2 + x_3 = 15$

                 $x_1, x_2, x_3 \geq 0$

(b) Obtain the dual from the following primal problem :   **6**

Minimise $Z = x_1 - 3x_2 - 2x_3$

Subject to $3x_1 - x_2 + 3x_3 \leq 7$

                 $2x_1 - 4x_2 \geq 12$

               $- 4x_1 + 3x_2 + 8x_3 = 10$

        $x_1, x_2 \geq 0, \quad x_3$ is unrestricted.

(c) A biased cosin tossed 5 times and the whole experiment is repeated 200   **8**
times. The following frequencies of 0, 1, 2, ... heads ere obtained.

No. of heads	0	1	2	3	4	5
Frequency	12	56	74	69	18	1

Fit a suitable distribution and test the goodness of fit.

7. (a) Obtain the rank correlation coeficient   6

X	10	12	18	18	15	40
Y	12	18	25	25	50	25

(b) A military expert claims that the citizens of city A are fitter than the citizens   6
of B. His claim is based on the findings that 96 out of 200 citizens of A
passed a standard of fitness as against 84 out of 200 of B. Is his claim
well-founded ?

(c) Solve the following LPP :   8

     Maximise $Z = -x_1 + 2x_2 - x_3$

     Subject to $3x_1 + x_2 - x_3 \leq 10$

                 $-x_1 + 4x_2 + x_3 \geq 6$

                  $x_2 + x_3 \leq 4$

                  $x_1,\ x_2,\ x_3 \geq 0$

Determine the ranges for discrete changes in b_2 and b_3 so as to maintains
the feasibility of the current optimal solution.

Con. 5785-10.　　　　　**(OLD COURSE)**　　　　　**GT-7008**

Digital Communication
(3 Hours)　　　　　**[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory**.
　　　 (2) Attempt any **four** out of remaining **six** questions.
　　　 (3) **Assume** suitable data if **necessary**.

1. Answer the following :—　　　　　　　　　　　　　　　　　　　**20**
　　(a) Compare Binary PSK and Binary FSK.
　　(b) State the advantages and applications of Uniform Quantizers.
　　(c) Define signal to Noise Ratio, Noise Factor, Noise Figure, Noise Temperature and Noise Bandwidth.
　　(d) Determine the condition for maximum entropy of source. How does entropy vary with probability ?

2. (a) What is a matched filter in a communication system ? Derive the expression for　**10** probability of error of a matched filter.
　　(b) Discuss the losses encountered in the link design of communication system.　**10**

3. (a) The input to a binary communication system, denoted by random variable X, takes　**10** on one of the two values 0 or 1, with probabilities ¾ and ¼ respectively. Due to errors caused by noise in the systems, the output y differs from the input X occasionally. The behavior of the communication system is modelled by the conditional probabilities —
　　　$P (y = 1/ x = 1) = ¾$ and $P (y = 0 / x = 0) = 7/8$

　　Find —
　　　(i) $P (y = 1)$ and $P (y = 0)$
　　　(ii) $P (x = 1 / y = 1)$

　　(b) What is the necessity of equalization in digital transmission and explain the working　**10** of transversal equalizer ?

4. (a) Consider that the bit sequence given below is to be transmitted.　　　　**10**
　　　　1 0 1 1 0 0 1 0
　　Draw the resulting waveforms if the sequence is transmitted using
　　　　(i)　Unipolar RZ　　　　　(iii)　AMI
　　　　(ii)　Polar RZ　　　　　　(iv)　Split Phase Manchester.

　　(b) Draw the block diagram of DEPSK receiver system and explain its operation.　**10** Also write the advantages and disadvantages. Show that in DEPSK the errors occur in pairs.

[TURN OVER

5. (a) Derive the expression for probability of error for coherently detected BPSK.   **10**

  (b) The voice signal in PCM system is quantized in 16 levels with the following   **10**
probabilities :

$$P_1 = P_2 = P_3 = P_4 = 0.1$$
$$P_5 = P_6 = P_7 = P_8 = 0.05$$
$$P_9 = P_{10} = P_{11} = P_{12} = 0.075$$
$$P_{13} = P_{14} = P_{15} = P_{16} = 0.025.$$

Calculate the entropy and information Rate.
Assume fm = 3kHz.

6. (a) The parity check matrix of a particular (7, 4) linear block code is given by —   **10**

$$[H] = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

    (i) Find the generator matrix (G).
    (ii) List all code vectors.
    (iii) What is the minimum distance between the code vectors ?
    (iv) How many errors can be detected ?

  (b) Explain systematic cyclic code generator circuit by shift register and decoding   **10**
process of the cyclic code.

7. (a) Explain signature authentication using public key crypto system.   **10**

  (b) Consider the five source symbols (messages) of a discrete memoryless source   **10**
and their probabilities as shown below. Follow the Huffman's Algorithm to find
the codewords for each message. Also find the average code word length and
the average information per message.

Message	M_1	M_2	M_3	M_4	M_5
Probability	0.4	0.2	0.2	0.1	0.1

Con. 5509–10. (REVISED COURSE) **GT-6786**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No. 1** is **compulsory**.

(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) What is Operating System ? Explain multiprogramming and time sharing operating **10** system.

   (b) What is disk scheduling ? What are various disk scheduling algorithms ? Explain **10** the criteria for selecting the best disk scheduling algorithm.

2. (a) What is RTOs ? Give the classification of RTOs and comparison of any two **10** RTOs.

   (b) Calculate Hit and faults using FIFO, OPT and LRU page replacement policies **10** for the following page sequences :—

      2, 3, 5, 4, 2, 5, 7, 3, 8, 7

   Assume page frame size is 3.

3. (a) What are the various buffering techniques ? Explain each one in detail. **10**

   (b) Give five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB **10** (in order) how would the first-fit, best-fit and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB (in order) ? Which algorithm makes the most efficient use of memory ?

4. (a) Explain various file allocation methods. **10**

   (b) Consider the following Snapshot of a system :— **10**

Processes	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

   Answer the following questions using the Banker's algorithm.

   (i) What is the content of matrix Need ?

   (ii) Is the system in a safe state ?

   (iii) If the request from process P_1 arrives for (0, 4, 2, 0) can request be granted immediately ?

5. (a) What is Semaphore ? Explain different types of semaphore. **10**
   (b) Explain files in relation with following points :– **10**
      (i) File Structure
      (ii) File Operation
      (iii) File Access
      (iv) File Types.

6. (a) Explain message based IPC with an example. **10**
   (b) Describe the differences among short term, medium term and long term schedulers. **10**

7. Write short notes on any **four** of the following :– **20**
   (a) Race Condition
   (b) Threads
   (c) Network O.S Vs. Distributed O.S
   (d) Symbian O.S
   (e) Inode.

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Con. 5525–10.   (REVISED COURSE)   **GT–6792**

(3 Hours)   **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.

(2) Draw **neat** diagrams.

(3) Elaborate with examples.

(4) Solve any **four** from the rest.

1. Perform the domain analysis for the airline reservation system. Develop use case **20**
   and object model. Apply design patterns from java to implement an application.
   Document each design pattern used in proper format. Finally convert major object
   in the problem domain into database.

2. (a) Explain the principles for good design.   **10**
   (b) Explain the guidlines for writing formal test cases and test plans.   **10**

3. (a) Explain the techniques for gathering requirements ? How to analyse them ?   **10**
   (b) What are nonfunctional requirements that affects quality, environment and technology **10**
       of the system ? How ?

4. (a) Develop a usecase diagram for library management system. Document each   **10**
       usecase in proper format.
   (b) Explain the principles of usability.   **10**

5. (a) Explain the guidlines in developing GUI for an application. Implement library   **10**
       system GUI using java.
   (b) Elaborate on Architectural patterns, Design patterns and Frameworks.   **10**

6. (a) Explain the terms : Usability Testing, User Satisfaction Testing, Quality   **10**
       Assurance Testing.
   (b) Explain rational unified process.   **10**

7. (a) Explain the types of design patterns.   **10**
   (b) Develop object model for ATM application.   **10**

(3 Hours)   [Total Marks : 100

N.B.: (1) Question No. 1 is **compulsory**, solve any **four** questions from questions No. 2 to question No. 7.

(2) Mention your answers with neat **sketches** and **examples** wherever **necessary**.

(3) **Assume** any data and mention the **same** while attempting the questions.

1. Attempt the following :—
   (a) Explain characteristics of connection oriented and connectionless service, list various examples for both the services.   5
   (b) Explain ISO-OSI layered Architecture in brief.   5
   (c) Compare LAN-WAN and MAN.   5
   (d) Explain different Network Topologies with neat sketches.   5

2. (a) Explain ASK FSK and PSK in detail.   10
   (b) Explain different Transmission media in detail with neat sketches and it's Technical characteristics.   10

3. (a) What are various functions of Data Link Layer ? Explain with suitable examples.   10
   (b) What do you mean by bridge ? Explain bridging techniques in detail.   10

4. (a) What are various design requirements for Routing protocol ? Explain Link State Routing.   10
   (b) What do you mean by Logical Address and Physical Address ? Explain Network addresses in detail.   10

5. (a) What are different types of Traffic ? Explain leaky bucket algorithm in brief.   10
   (b) What do you mean by Encryption ? Explain Symmetric key and Assymetric key method in detail.   10

6. (a) Explain ISDN protocol stack in detail with neat sketch.   10
   (b) Explain classification of signalling techniques.   10

7. Write short note on any **four** of following :—   20
   (a) Traffic Management in ATM
   (b) TMN
   (c) SNMP
   (d) 3G UMTS Network
   (e) Digital Signature and Certificates
   (f) Data Multiplexing.

Con. 5516–10.   (OLD COURSE)   GT–6930

(3 Hours)   [Total Marks : 100]

N.B. : (1) Question No. 1 is **compulsory**.

      (2) Attempt any **four** questions out of remaining **six** questions.

      (3) Assume **suitable** data wherever **required**.

Q.1 (a) Explain Stop and wait protocol and sliding window protocol with example and suitable diagram.   10

    (b) Explain different types of routing algorithms.   10

Q.2 (a) Give the functions of repeater, hub, bridge, switch ,router, gateway.   10

    (b) Explain why the ISO-OSI model of computer network is layered? How it is different from

      TCP/IP model.   10

Q.3 (a) Describe the following in brief: 10

      1. Slotted ALOHA

      2. CSMA/CD

      3. Piggybacking

      4. Digital Certificate

    (b) what is the purpose of Digital Subscriber Line (DSL)?Explain ADSL.   10

Q.4 (a) How TC P controls congestion?   10

    (b) Explain DNS and SMTP.   10

Q.5 (a) What is count to infinity problem in distance vector routing?   10

    (b) what are transport service primitives.   10

Q.6 (a) What is HDLC? Explain the frame formats of I-frame, U-frame and S-frame.   10

    (b) List 10 important features of IPV6 protocol.   10

Q.7 (a) What is CRC? Explain the algorithm for computing checksum and

      explain it with suitable example.   10

    (b) How mails are sent or received? Show it with example.   10

(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory.**
(2) Solve any **four** questions from the remaining **six** questions.

1. Design a 8086 based system consisting of the following :—   **20**
   - (a) 8086 microprocessor working at 8 MHz.
   - (b) EPROM of 32 kB using 16 kB devices.
   - (c) SRAM of 64 kB using 16 kB devices.
   - (d) Input, 1 output port (both 16 bits).

   Explain the design.

2. (a) Explain the necessity of a Bus Controller in the 8086 maximum mode system. Also, **10**
       explain the 8288 Bus Controller with a neat block diagram.
   - (b) Write an assembly language program using string instructions to transfer a block **10**
       of 10 bytes from one memory location to another.

3. (a) Explain the various data types supported by the 8087 NDP.   **10**
   - (b) Draw and explain the various signals in 8086-8087 interface. Explain the process **10**
       of executing 8086-87 programs.

4. (a) Explain the various Initialization Command Words (ICWs) and Operational Command **10**
       Words (OCWs) is the 8259 PIC.
   - (b) What are the variuos modes of operation of 8255 PPI ? Explain each mode in **10**
       detail.

5. (a) Draw and explain the block diagram of the 8237 DMA controller.   **10**
   - (b) Explain the concept of memory banking in 8086 systems. Give examples of aligned **10**
       and misaligned data transfers.

6. (a) Explain the need of Bus Arbitration. What are the various Bus Arbitration Schemes **10**
       in loosely coupled systems ?
   - (b) Explain the Interrupt Structure on the 8086 microprocessor.   **10**

7. Write short notes on (any **four**) :—   **20**
   - (a) 8284 clock generator.
   - (b) Serial communication using RS-232C
   - (c) IEEE-488 GPIB standard.
   - (d) Memory mapped I/O and I/O mapped I/O.
   - (e) 8250 UART.

55 : 2nd half.10-AM(c)

Con. 6022-10. (REVISED COURSE) **GT-6798**

(3 Hours) [Total Marks : 100

N.B.: (1) Question No. 1 is **compulsory.**.
  (2) Solve any **four** questions from remaining question No. **2** to question No. **7**.
 (3) Draw **neat** diagrams wherever **necessary**.

1. (a) Explain bitmap and vector-based graphics. 5
  (b) Explain the Two-Point perspective transformation. 5
  (c) Describe in brief physical modeling. 5
  (d) Compare the CMY and RGB color model. 5

2. (a) Write the DDA line drawing Algorithm. Calculate the pixel co-ordinates of line 10
    AB using DDA Algorithm. Where A = (0,0) and B = (4,6).
  (b) Write the matrices and draw the diagrams for scaling, rotation of an 3D object. 10

3. (a) Describe the Sutherland–cohen line clipping algorithm used for 3D. 10
  (b) Describe Halftoning, Thresholding and Dithering in detail. 10

4. (a) Explain LeGrange Interpolated curves. 10
  (b) Describe the various warping techniques. 10

5. (a) Describe the design of a Virtual Reality System. Also explain types of Virtual 10
    Reality Systems.
  (b) Explain the graphical rendering pipeline. 10

6. (a) Describe the input and output devices for Virtual Reality. 10
  (b) Explain in detail the Sun Blade 1000 Architecture. 10

7. (a) Explain the Winding Number Method. 5
  (b) Explain Virtual Reality Programming with reference to JAVA 3D. 5
  (c) Describe the Motion Control Methods. 5
  (d) Explain the applications of Virtual Reality in military and medicine. 5

(3 Hours) [Total Marks : 100]

Manufuring Process Planning & System

N.B. : (1) Question No. 1 is **compulsory**. Answer any **four** out of remaining **six** questions.
(2) **All** dimensions mentioned in the component **drawing** are in **mm**.
(3) Use of **standard code sheets** for **G** codes and **M** codes is **permitted**.

T. E. /IT/ Sem - Y / Revised

Q1.
a. What is Automation? What are its advantages and dis-advantages? 05
b. Discuss the role played by Computers in various aspects of Manufacturing. 05
c. Describe any 5 operations that are carried on a lathe, with neat sketches. 10

Q. 2
a. Explain any one Hot working process in detail. Differentiate between Hot working and cold working. 06
b. Describe any two Welding processes in detail. 06
c. How are polymers classified? Describe the properties and applications of any four commercially important polymers. 08

Q. 3
a. Explain in detail, the concept of TQM. Discuss various quality activities involved in TQM. 08
b. For the given Component Drawing, prepare a suitable Process Plan. Mention clearly, the Operation Number, Description of the operation; the machine used; Tooling used and Measuring Instruments required. 12
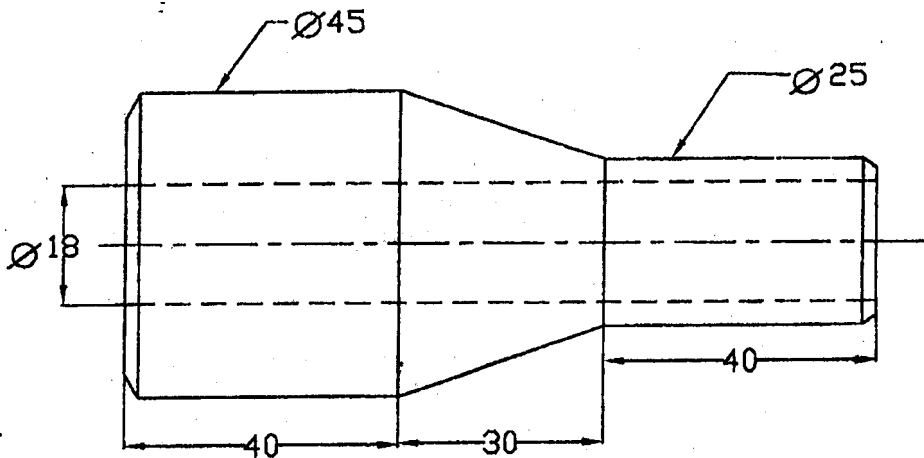

Q.4
a. What are the objectives and Advantages of SQC? 08
Explain any two SQC tools, in detail.

b. Construct the $\overline{X}$ and R chart for the following data and conclude whether the process is able to meet the specifications. 12

Batch No.	$\overline{X}$	R	
1	23.765	0.07	
2	23.77	0.11	
3	23.7716	0.06	$A_2 = 0.48$
4	23.7767	0.08	$D_3 = 0$
5	23.7717	0.04	$D_4 = 2.00$
6	23.7583	0.05	

Q.5

a. Explain clearly 1) NC 2) CNC 3) DNC and 4) DNC II   08
b. For the given component drawing, write a suitable part program, to machine   12
the outer profile and to drill the holes. Make suitable assumptions regarding
the tools, speed and feed rates. Show on your sketch, the set point and the axes.
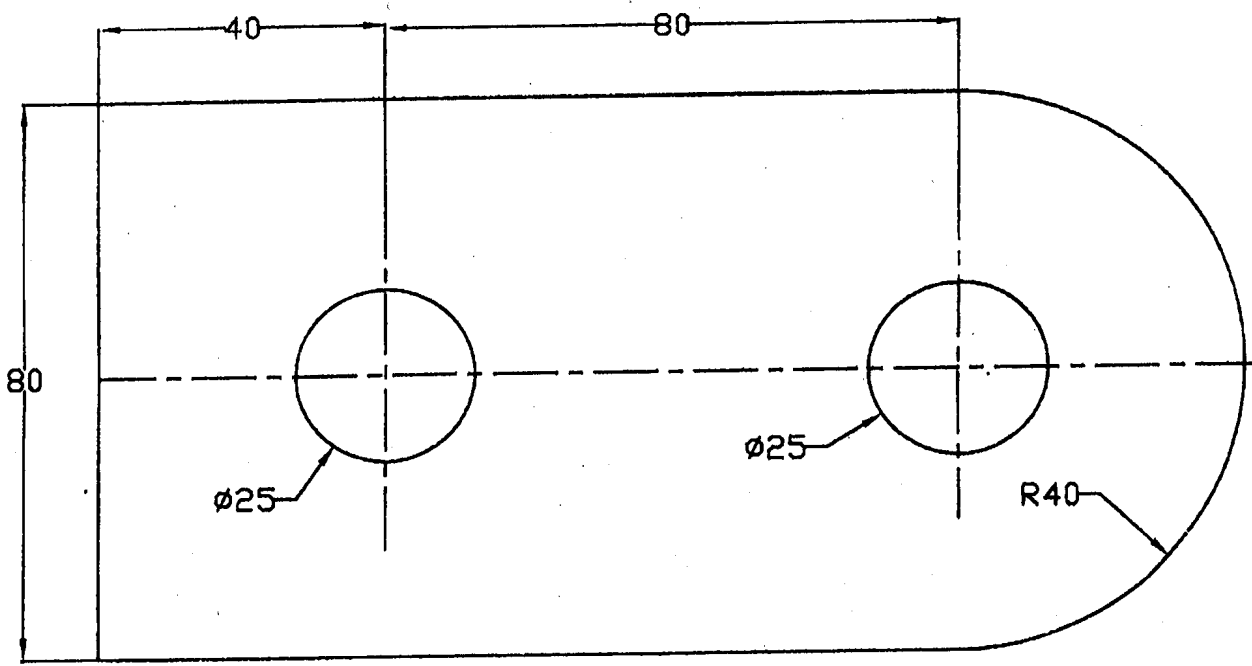
Q.6

a. Explain the concept and working of a Flexible Manufacturing System,   10
with a neat sketch of a schematic layout.
b. Explain what is MRP? Elaborate on its working, its inputs and outputs and   10
its benefits.

Q. 7. Write short notes on any four out of the following: 20
1) Group Technology
2) Up Milling and Down Milling
3) Lean manufacturing
4) Product Layout and Process Layout
5) Master Production Schedule
6) Ergonomics

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P4-Con No-46

Con. 5707-10.　　　　　　　(OLD COURSE)　　　　　GT-7012

(3 Hours)　　　　　　　[Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
　　　　(2) Attempt any **four** questions from remaining **six** questions.
　　　　(3) **Figures** to the **right** indicate **full** marks given to the question.
　　　　(4) Assume **suitable** data, if **necessary**.

1. a) Justify the term "Automata Theory".　　　　　　　　　　　**5**
　 b) What is NP-Hard problem? Expalin.　　　　　　　　　　　**5**
　 c) Represent the language over $\sum$ = {a. b} with all strings starting and ending with 'a' and any number of 'b's in between.　　　　　　　　　**5**
　 d) Draw NFA with ϵ- moves for the regular expression　$a \cdot (a + b)^*$.　　**5**

2. a) Convert NFA　　　　　　　　　　　　　　　　　　　　**10**
　　$M = \{\{q_0, q_1\}, \{0,1\}, \delta, q_0, \{q_1\}\}$ where, δ is as shown below to an equivalent DFA.

Q \ Σ	0	1
q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	Φ	$\{q_0, q_1\}$

　 b) Design a Mealy machine accepting the language consisting of strings from $\sum^*$ where $\sum$ = {0, 1} and ending with double zero's or double one's.　　**10**

3. a) Design Turing Machine which will compare two numbers 'm' and 'n' represented in unary format and produces output 'G' for m > n, 'L' for m < n and 'E' if m=n.　**10**
　 b) Let G be the Grammar -　　　　　　　　　　　　　　　**10**
　　　　$S \rightarrow aB \mid bA$
　　　　$A \rightarrow a \mid aS \mid bAA$
　　　　$B \rightarrow b \mid bS \mid aBB$
　 Where 'S' as the starting symbol. Find the leftmost and rightmost derivation and parse tree for the string 'bbaaba'.

4. a) Describe the CFL generated by the following Grammar G.　　　**10**
　　　　$G = \{ \{S\}, \{a, b, \epsilon\}, P, S \}$
　　　　Where 'P' consists of　$S \rightarrow aSa \mid bSb \mid a \mid b \mid \epsilon$
　 b) Check whether the following grammar is ambiguous or not, if found ambiguous, remove the ambiguity and write an equivalent unambiguous grammar.　　**10**
　　　　$S \rightarrow iCtS \mid iCtSeS \mid e$
　　　　$C \rightarrow b$

5. a) Construct a PDA accepting the language L = { $a^n b^n \mid n \geq 0$ }.　　**10**
　 b) Convert the following grammar to Chomsky Normal Form (CNF).　**10**
　　　　$S \rightarrow bA \mid aB$
　　　　$A \rightarrow bAA \mid aS \mid a$
　　　　$B \rightarrow aBB \mid bS \mid b$

C → b   10

5. a) Construct a PDA accepting the language L = { $a^n b^n$ | n ≥ 0 }.   10
   b) Convert the following grammar to Chomsky Normal Form (CNF).   10

   S → bA | aB
   A → bAA | aS | a
   B → aBB | bS | b

6. a) Prove that the
   L = { 0^{i^2} | i is an integer, i ≥ 1} is non-regular using Pumping Lemma. 5
   b) Design a FSM to determine whether a binary number is divisible by 3.   5
   c) Define different types of grammars with example.   10

                                                                           20
7. Write short notes on any four:-
   a) Universal Turing Machine.
   b) The Halting Problem.
   c) Post's Correspondence Problem (PCP).
   d) Removal of useless symbol.
   e) Greibach Normal Form (GNF).