# B.Tech V Semester End Examinations, December 2023

## ARTIFICIAL INTELLIGENCE (20APC0508T)

## (COMPUTER SCIENCE AND ENGINEERING)

Time: 3 Hours | Max. Marks: 70

### PART-A (10 X 2 = 20 M)

**(Compulsory Question)**

| Answer the following. | | Unit | Marks |
|---|---|---|---|
| 1 | a) What is cognitive model approach. | I | (2 M) |
| | b) How AI is used in speech recognition. | I | (2 M) |
| | c) Define heuristic function. | II | (2 M) |
| | d) Who are online search agents. | II | (2 M) |
| | e) Write different categories of knowledge representation. | III | (2 M) |
| | f) Define default logic. | III | (2 M) |
| | g) Define domain. | IV | (2 M) |
| | h) Define atomic sentence. | IV | (2 M) |
| | i) What is meant by perception. | V | (2 M) |
| | j) What are agent components. | V | (2 M) |

### PART-B (5 X 10 = 50 M)

**(Answer One FULL Question from each Unit; All questions carry EQUAL marks)**

**UNIT-I**

2 Is AI a science, or is it engineering? Or neither or both? Explain. (10 M)

**(OR)**

3 Explain about simple reflex agent. (10 M)

**UNIT-II**

4 Explain infrastructure for search algorithms. (10 M)

**(OR)**

5 Discuss about uniform cost search. (10 M)

**UNIT-III**

6 Explain different types of objects used to represent knowledge. (10 M)

**(OR)**

7 What are frames? Give a sample frame of a Hospital. (10 M)

**UNIT-IV**

8 Consider a vocabulary with the following symbols: (10 M)

i) Occupation(p, o): Predicate. Person p has occupation o.
ii) Customer (p1, p2): Predicate. Person p1 is a customer of person p2.
iii) Boss(p1, p2): Predicate. Person p1 is a boss of person p2.
iv) Doctor , Surgeon, Lawyer , Actor : Constants denoting occupations.
v) Emily, Joe: Constants denoting people.

Use these symbols to write the following assertions in first-order logic:

a) Emily is either a surgeon or a lawyer.
b) Joe is an actor, but he also holds another job.
c) All surgeons are doctors.
d) Joe does not have a lawyer (i.e., is not a customer of any lawyer).
e) e. Emily has a boss who is a lawyer.

**(OR)**

9 Explain and illustrate unification algorithm. (10 M)

**UNIT-V**

10 Explain ethics and risks of AI. (10 M)

**(OR)**

11 Explain agent architecture. (10 M)

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RU20 Regulations

# B.TECH V SEMESTER END EXAMINATIONS, DECEMBER 2023
## FORMAL LANGUAGES AND AUTOMATA THEORY (20APC0510)
### (COMPUTER SCIENCE & ENGINEERING)

Time: 3 Hours | Max. Marks: 70

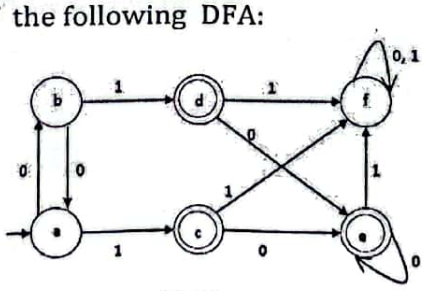
## PART-A (10 X 2 = 20 M)
**(Compulsory Question)**

| | **Answer the following.** | **Unit** | **Marks** |
|---|---|---|---|
| 1 a) | Define the terms alphabet and Language with example. | I | (2 M) |
| b) | Distinguish between Mealy and Moore. | I | (2 M) |
| c) | Write regular expressions for the following languages over {0, 1}*.<br>(i) The set of all strings that contain 01 as substring.<br>(ii) Set of all strings starts with 10. | II | (2 M) |
| d) | What is pumping lemma for regular grammar. | II | (2 M) |
| e) | Eliminate Useless symbols from the given grammar<br>A→ xyz / Xyzz<br>X → Xz / xYz<br>Y→ Yy / Xz<br>Z → Zy / z | III | (2 M) |
| f) | Discuss Chomsky hierarchy of languages and their recognizers | III | (2 M) |
| g) | How to convert grammar to PDA | IV | (2 M) |
| h) | Define Context Free Language | IV | (2 M) |
| i) | Define Turing machine with its model. | V | (2 M) |
| j) | Give an example of Undecidable problem. | V | (2 M) |

## PART-B (5 X 10 = 50 M)
**(Answer One FULL Question from each Unit; All questions carry EQUAL marks)**

### UNIT-I

2 Explain the Minimization of the following DFA: (10 M)




**(OR)**

3 Explain the procedure to convert the given Construct the Mealy Machine into Moore Machine. (10 M)

| P.S | Input 0 | | Input 1 | |
|---|---|---|---|---|
| | State | o/p | State | o/p |
| q0 | q0 | 1 | q1 | 1 |
| q1 | q3 | 1 | q3 | 1 |
| q2 | q1 | 1 | q2 | 1 |
| q3 | q2 | 0 | q2 | 0 |

**UNIT-II**

4 a) Derive a Finite Automata for the following regular expression (ab+a)*(aa+b) (10 M)

b) Prove that (1+00*1) + (1+00*1) (0+10*1)*(1+10*1) = 0*1(0+10*1)*.

**(OR)**

5 a) Construct FA equivalence to the following regular expression r = ((0 + 1)(1 + 01) *00)* (10 M)

b) Prove that L= {ww/w in (a+b)*} is not regular

**UNIT-III**

6 Explain the procedure for CNF and Obtain the CNF for the following Grammar. (10 M)

S → 0A | 1B

A → 0A A| 1S|1

B → 1BB| 0S|0

**(OR)**

7 a) Determine a CFG for the language L={$a^n b^m a^m b^n$, where n, m >=1}. (10 M)

b) Determine the CFG with no useless symbols equivalent to : S→AB / CA , B→BC / AB, A→a , C→aB / b.

**UNIT-IV**

8 a) Construct PDA accepting L={$a^p b^q c^m$ /p+m=q } (10 M)

b) Explain the applications of Push down Automata

**(OR)**

9 a) Prove that the language L = {$0^n 1^m$/ n = $2^m$ and m, n ≥ 1} is a deterministic CFL by constructing PDA moves (10 M)

b) Construct PDA for the Language L = {$wcw^r$ / w Є {0, 1}*}

**UNIT-V**

10 a) Construct TM to accept the language of Palindromes over {0, 1 } (10 M)

b) Give a Turing Machine to construct the addition of two numbers which is represented in Unary form.

**(OR)**

11 a) Explain NP-Hard, NP-Complete problems and give an example on it. (10 M)

b) Design a TM to compute one's complement of a given binary number.

RU20 Regulations

# B.Tech V Semester End Examinations, July 2023
## DATA SCIENCE (20APC0509T)
## (Computer Science & Engineering)

Time: 3 Hours | Max. Marks: 70

**PART-A** (10 X 2 = 20 M)

**(Compulsory Question)**

| Answer the following. | Unit | Marks |
|---|---|---|
| a) What is the need of analyzing data ? | I | (2 M) |
| b) Define a list in python using simple code. | I | (2 M) |
| c) Define hypothesis. Write its importance in data science. | II | (2 M) |
| d) What is gradient descent? | II | (2 M) |
| e) Define classification. | III | (2 M) |
| f) What is machine learning ? | III | (2 M) |
| g) What is linear regression? Give the equation for linear regression. | IV | (2 M) |
| h) What is decision tree how it is useful for classification. | IV | (2 M) |
| i) What is meant by Clustering? Give real life example. | V | (2 M) |
| j) Write structure of map reduce program. | V | (2 M) |

**PART-B** (5 X 10 = 50 M)

**(Answer One FULL Question from each Unit; All questions carry EQUAL marks)**

**UNIT-I**

2 Define Dictionary. Write a python program to find unique values in the dictionary. (10 M)

**(OR)**

3 List out the applications of data science. (10 M)

**UNIT-II**

4 What statistics needed for data science? (10 M)

**(OR)**

5 What is gradient descent explain how it works? (10 M)

**UNIT-III**

6 Explain k-nearest neighbours algorithm with an example. Write its advantages. (10 M)

**(OR)**

7 How do we get data for data science ? (10 M)

**UNIT-IV**

8 What is logistic regression ? Explain how it is calculated. (10 M)

**(OR)**

9 Define neural networks write activation functions used in neural networks. (10 M)

**UNIT-V**

10 What is the role of NLP in data science? (10 M)

**(OR)**

11 Explain how map reduce programs are executed. (10 M)

**B.TechV Semester EndExaminations,**

**DECEMBER2023**

**CRYPTOGRAPHYANDNETWORKSECURITY**

**(20APE0501)(COMPUTERSCIENCEANDENGINEERING)**

Time:3 Hours | Max. Marks: 70

**PART-A** **(10X2=20M)**

**(CompulsoryQuestion)**

| Answerthefollowing. | | | Unit | Marks |
|---|---|---|---|---|
| 1 | a) | Define attack write different types of attacks. | I | (2M) |
| | b) | Explain four main groups of cryptographic algorithms and protocols. | I | (2M) |
| | c) | What is the difference between an index and a discrete logarithm ? | II | (2M) |
| | d) | Write principle of public key cryptography. | II | (2M) |
| | e) | What is HMAC. | III | (2M) |
| | f) | Define digital signature and write advantages of it. | III | (2M) |
| | g) | Why does PGP generate a signature before applying compression? Explain. | IV | (2M) |
| | h) | What are IPSec functional areas? | IV | (2M) |
| | i) | Write some characteristics of fire walls. | V | (2M) |
| | j) | What is the use SSH. | V | (2M) |

**PART-B** **(5X10=50M)**

**(AnswerOneFULLQuestionfromeachUnit;AllquestionscarryEQUALmarks)**

| | | |
|---|---|---|
| | **UNIT-I** | |
| 2 | Discuss the types of security threats and attacks that must be delat with and give example s of the types of threats and attacks that apply to different categories of computer and network assets. | (10M) |
| | **(OR)** | |
| 3 | Explain DES algorithm with neat diagram. | (10M) |
| | **UNIT-II** | |
| 4 | In detail explain Chinese Remainder theorem with an example. | (10M) |
| | **(OR)** | |
| 5 | Explain RSA algorithm with neat example. | (10M) |
| | **UNIT-III** | |
| 6 | Explain about digital signature process. | (10M) |
| | **(OR)** | |
| 7 | Explain SHA-512 algorithm. | (10M) |
| | **UNIT-IV** | |
| 8 | Explain the IPSec management. | |
| | **(OR)** | |
| 9 | Explain five principles services provided by PGP. | (10M) |
| | **UNIT-V** | |
| 10 | Write about TLS. | (10M) |
| | **(OR)** | |
| 11 | Explain different types of firewalls. | (10M) |

B.Tech (RU20) V Semester End Examinations, Dec-2023

**OPTIMIZATION TECHNIQUES (20AOE5401)**

**(MECHANICAL ENGINEERING)**

Time : 3 Hours Max. Marks : 70

PART – A (10 X 2 = 20 Marks)

| Answer the following: | | | Unit | Marks |
|---|---|---|---|---|
| 1 | a) | Write applications of LPP? | I | (2 M) |
| | b) | Write a note on Big-M method? | I | (2 M) |
| | c) | Write applications of Transportation problems? | II | (2 M) |
| | d) | What are the advantages of game theory? | II | (2 M) |
| | e) | What is Network diagram? | III | (2 M) |
| | f) | What is critical path? Write its applications? | III | (2 M) |
| | g) | Define capital cost? | IV | (2 M) |
| | h) | Write a note on BEP? | IV | (2 M) |
| | i) | Define EOQ? | V | (2 M) |
| | j) | Write the advantages of inventory? | V | (2 M) |

PART – B (5 X 10 = 50 Marks)

(Answer One FULL Question from each Unit; All questions carry EQUAL marks)

**UNIT – I**

| | | |
|---|---|---|
| 2 | The products A. B and C are produced in three machine centres X, Y and Z. Each product involves operation of each of the machine centres. The time required for each operation for unit amount of each product is given below. 100, 77 and 80 hours are available at machine centres X, Y and Z respectively. The profit per unit of A, B and C is Rs. 12, Rs. 3 and Rs. 1 respectively. Find out a suitable product mix so as to maximise the profit. | (10 M) |
| | **(OR)** | |
| 3 | Maximize $z = 3x_1, + 2x_2$ subject to the constraints : $2x_1 + x_2 \leq 2,\ 3x_1 + 4x_2 \geq 12,\ x_1, x_2 \geq 0.$ | (10 M) |

**UNIT – II**

| | | |
|---|---|---|
| 4 | Find the optimal plan for both the player. | (10 M) |

| | | Player-B | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Player-A | I | -2 | 0 | 0 | 5 |
| | II | 4 | 2 | 1 | 3 |
| | III | -4 | -3 | 0 | -2 |
| | IV | 5 | 3 | -4 | 2 |

**(OR)**

| | | |
|---|---|---|
| 5 | A Company has four men available for work on four separate jobs. Only one man can work on any one job. The cost of assigning each man to each job is given in Table 2.2. Assign men to jobs in such a way that the total cost of assignment is minimum. | (10 M) |

| | | | |
|---|---|---|---|
| | Job<br>Person<br>I II III IV<br>A 20 25 22 28<br>B 15 18 23 17<br>C 19 17 21 24<br>D 25 23 24 24 | | |
| | **UNIT – III** | | |
| 6 | By using graphical method, find the maximum and minimum values of the function Z = x – 3y where x and y are non-negative and subject to the following conditions: 3x + 4y ≥19, 2x – y ≤ 9 2x + y ≤15 x – y ≥ – 3. | (10 M) |
| | **(OR)** | | |
| 7 | Draw a network diagram of the following schedule of activities and find its critical path. Also calculate slack time for each event.<br>Activity: 1-2, 1-3, 1-4, 2-6, 3-7, 3-5, 4-5, 5-9, 6-8, 7-8, 8-9<br>Duration (in days): 2, 2, 1, 4, 5, 8, 3, 5, 1, 4, 3 | (10 M) |
| | **UNIT – IV** | | |
| 8 | There are nine jobs, each of which must go through two machines P and Q in the order PQ, the processing times (in hours) are given below:<br>Machine / Job(s): A B C D E F G H I<br>P: 2 5 4 9 6 8 7 5 4<br>Q: 6 8 7 4 3 9 5 8 11<br>Find the sequence that minimizes the total elapsed time T. Also calculate the total idle time for the machines in this period. | (10 M) |
| | **(OR)** | | |
| 9 | The cost of a bike is $ 3000. The salvage value (resale value) and the running cost are given as under. Find the most economical replacement age of the truck.<br>Year: 1 2 3 4 5 6 7<br>Running Cost: 600 700 800 900 1000 1200 1500<br>Resale value: 2000 1333 1000 750 500 300 300 | (10 M) |
| | **UNIT – V** | | |
| 10 | A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for a year is Rs. 2 and the setup cost of a production run is Rs. 180. How frequently should production run be made? Also find production run time and total variable cost (Assume 300 days in the year). | (10 M) |
| | **(OR)** | | |
| 11 | Explain in detail about Single period inventory models with shortage cost. | (10 M) |

**20APE0501**

B.Tech. DEGREE EXAMINATION, FEBRUARY/MARCH 2023.

Fifth Semester

Computer Science and Engineering

CRYPTOGRAPHY AND NETWORK SECURITY

(RU20 Regulations)

*Time : 3 Hours* *Max. Marks : 70*

PART — A

(Compulsory question)

Answer the following. **(10 × 2 = 20 Marks)**

1. (a) Write model for network security.

(b) Differentiate symmetric and asymmetric encryption.

(c) Write Fermat's theorem.

(d) What is GF(p) and GF(2n).

(e) Define HMAC.

(f) What is authentication function?

(g) What is MIME?

(h) What is ESP?

(i) Write applications of SSH.

(j) Write firewall characteristics.

Turn Over

## PART — B

Answer ONE full question from each Unit; All questions carry equal marks.

**(5 × 10 = 50 Marks)**

### UNIT – I

2. Explain DES.

Or

3. Write about different AES transformation functions used in AES algorithm.

### UNIT – II

4. Explain RSA algorithm with neat example.

Or

5. Explain Elliptic curve cryptography.

### UNIT – III

6. Define digital signature explain how we create it.

Or

7. What is X.509 certificate.

### UNIT – IV

8. Write two phases of PGP.

Or

9. Write short notes on Kerberos.

### UNIT – V

10. What requirements we need to achieve web security?

Or

11. Explain how we configure firewalls.

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**20APC0509T**

20RU1A0536

B.Tech. DEGREE EXAMINATION, FEBRUARY/MARCH 2023.

Fifth Semester

Computer Science and Engineering

DATA SCIENCE

(RU20 Regulations)

*Time : 3 Hours* *Max. Marks : 70*

PART — A

Compulsory question. **(10 × 2 = 20 Marks)**

Answer the following.

1. (a) Write advantages of python .

   (b) Define list.

   (c) What is conditional probability.

   (d) Define Simpson's paradox.

   (e) What is machine learning.

   (f) What is bias and variance.

   (g) Define perceptron.

   (h) Define linear regression.

   (i) Define Eigen vector.

   (j) What is item based collaborative filtering.

PART — B

Answer ONE full question from each unit; ALL questions carry equal marks.

**(5 × 10 = 50 Marks)**

UNIT – I

2. Explain different types of control flow statements supported by python.

Or

3. Explain generators and iterators in python with an example program.

Turn Over

UNIT – II

4. Write about central limit theorem.

Or

5. Write short notes on stochastic gradient descent.

UNIT – III

6. Discuss about dimensionality reduction.

Or

7. Explain KNN algorithm with neat example.

UNIT – IV

8. Write short notes on SVM.

Or

9. Explain the process to defeat a CAPTCHA

UNIT – V

10. Explain different types of DDL statement of SQL.

Or

11. Discuss about user based collaborative filtering.

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# 20APC0510

20KVIA0536

B.Tech. DEGREE EXAMINATION, FEBRUARY/MARCH 2023.

Fifth Semester

Computer Science and Engineering

FORMAL LANGUAGES AND AUTOMATA THEORY

(RU20 Regulations)

*Time : 3 Hours* *Max. Marks : 70*

PART — A

(Compulsory Question) **(10 × 2 = 20 Marks)**

Answer the following.

1. (a) Why it is important to study automata theory for computer science?

   (b) Differentiate Moore and Melay machines.

   (c) Write the Regular expression for the L={w €_{0,1}* | w has no pair of consecutive zeros ?

   (d) Define pumping Lemma.

   (e) How to convert grammar to push down automata ?

   (f) Explain the usage of parse tree in automata theory .

   (g) Discuss the Chomsky hierarchy of languages and their recognizers.

   (h) Differentiate Turing machine and push down automata.

   (i) Give examples of type NP-Complete.

   (j) Give an example of undecidable problem?

PART — B

Answer ONE full question from each Unit; ALL questions carry equal marks.

**(5 × 10 = 50 Marks)**

UNIT I

2. Design DFA to accept strings with 'c' and 'd' such that no.of d's are divisible by 4. (10)

Or

3. Show with an example equivalence between NFA with and without € transitions. (10)

Turn Over

UNIT II

4. What is relationship between finite automata and regular expression? Explain the process of converting DFA to regular expression. (10)

Or

5. Explain pumping Lemma for regular languages with the applications of pumping Lemma. (10)

UNIT III

6. Generate left most and right most derivation and parse tree for given grammars G1: S->0B | 1A , A->0 | 0S | 1AA, B->1|1S|0BB for the string 00110101.

G2: S->Ab | bA , A-a |aS | bAA, B->b | bS | aBB for the string aaabbabbba. (10)

Or

7. Find the equivalent grammar in CNF for S-> aA | aB , A->bAA | aS | a, B->aBB | bS | b (10)

UNIT IV

8. Construct the PDA for the given grammar S-> AA | a , A -> SA | b (10)

Or

9. Show that for every PDA then there exists a CFG such that L(G) = N(P)? (10)

UNIT V

10. Design Turing machine over {a,b} which can compute concatenation function over $\Sigma = \{a\}$. (10)

Or

11. What is NP problem ? Explain with travelling sales person problem. (10)

# 20AOE5401

B.Tech. DEGREE EXAMINATION, FEBRUARY/MARCH 2023.

Fifth Semester

Mechanical Engineering

OPTIMIZATION TECHNIQUES

(RU 20 Regulations)

*Time : 3 Hours* *Max. Marks : 70*

PART— A

Answer the following. **(10 × 2 = 20 Marks)**

1. (a) Write applications of LPP?

(b) Write a note on Big-M method?

(c) Write applications of Transportation problems?

(d) What are the advantages of game theory?

(e) What is Network diagram?

(f) What is critical path? Write its applications?

(g) Define capital cost?

(h) Write a note on BEP?

(i) Define EOQ?

(j) Write the advantages of inventory?

PART— B

(Answer One Full Question from each Unit; All questions carry Equal marks)

**(5 × 10 = 50 Marks)**

UNIT – I

2. (a) The products A. B and C are produced in three machine centres X, Y and Z. Each product involves operation of each of the machine centres. The time required for each operation for unit amount of each product is given below. 100, 77 and 80 hours are available at machine centres X, Y and Z respectively. The profit per unit of A, B and C is Rs. 12, Rs. 3 and Rs. 1 respectively. Find out a suitable product mix so as to maximise the profit.

Or

(b) Use penalty method to

Maximize $z = 3x_1, + 2x_2$ subject to the constraints :

$2x_1 + x_2 \leq 2,\ 3x_1 + 4x_2 \geq 12, x_1, x_2 \geq 0.$

UNIT – II

3. (a) Find the optimal plan for both the player.

| | | Player - B | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Player-A | I | -2 | 0 | 0 | 5 |
| | II | 4 | 2 | 1 | 3 |
| | III | -4 | -3 | 0 | -2 |
| | IV | 5 | 3 | -4 | 2 |

Or

(b) A Company has four men available for work on four separate jobs. Only one man can work on any one job. The cost of assigning each man to each job is given in Table 2.2. Assign men to jobs in such a way that the total cost of assignment is minimum.

| | | Job | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Person | A | 20 | 25 | 22 | 28 |
| | B | 15 | 18 | 23 | 17 |
| | C | 19 | 17 | 21 | 24 |
| | D | 25 | 23 | 24 | 24 |

UNIT – III

4. (a) By using graphical method, find the maximum and minimum values of the function Z = x – 3y where x and y are non-negative and subject to the following conditions: $3x + 4y \geq 19$, $2x - y \leq 9$ $2x + y \leq 15$ $x - y \geq -3$.

Or

(b) Draw a network diagram of the following schedule of activities and find its critical path. Also calculate slack time for each event.

| Activity | 1-2 | 1-3 | 1-4 | 2-6 | 3-7 | 3-5 | 4-5 | 5-9 | 6-8 | 7-8 | 8-9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Duration | 2 | 2 | 1 | 4 | 5 | 8 | 3 | 5 | 1 | 4 | 3 |

## UNIT – IV

5. (a) There are nine jobs, each of which must go through two machines P and Q in the order PQ, the processing times (in hours) are given below:

| Machine | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| P | 2 | 5 | 4 | 9 | 6 | 8 | 7 | 5 | 4 |
| Q | 6 | 8 | 7 | 4 | 3 | 9 | 3 | 8 | 11 |

Find the sequence that minimizes the total elapsed time T. Also calculate the total idle time for the machines in this period.

Or

(b) The cost of a bike is $ 3000. The salvage value (resale value) and the running cost are given as under. Find the most economical replacement age of the truck.

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Running Cost | 600 | 700 | 800 | 900 | 1000 | 1200 | 1500 |
| Resale value | 2000 | 1333 | 1000 | 750 | 500 | 300 | 300 |

## UNIT – V

6. (a) A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for a year is Rs.2 and the setup cost of a production run is Rs.180. How frequently should production run be made? Also find production run time and total variable cost (Assume 300 days in the year).

Or

(b) Explain in detail about Single period inventory models with shortage cost.