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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### ADVANCED DATABASE MANAGEMENT SYSTEM (Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Describe the necessity of integrity constraints, state primary key constraint and foreign key constraints briefly and create tables for student and college by using primary key and foreign key. [7M]
- (b) State different data models in database management system. Discuss briefly how the data models are useful in Enterprise application. [3M]
- (c) Distinguish between database system and file system? [4M]
2. (a) Define views and specify the commands for creating, destroying, and altering view tables. For following entities create a view SeniorEmp with the columns as sname, sage, salary from the given tables and implement update delete operations on the viewtable. [7M]  
Emp(eid: integer, ename: string, age: integer, salary: real)  
Works(eid: integer, did: integer, pct time: integer)  
Dept(did: integer, budget: real, managerid:integer)
- (b) What are structured data types and describe its operations, create a table PERSON which consists of three columns where two are of regular data types and other one should be abstract type. [4M]
- (c) List out and discuss the types of database languages? How those languages are useful for database applications. [3M]

#### UNIT – II

3. (a) Briefly discuss about object relational database management system implementation and challenges, and state the comparisons between RDBMS and ORDBMS? [7M]
- (b) Describe data partitioning and parallelizing sequential operator evaluation code with relevant examples. [7M]
4. (a) State parallel databases and design the architecture of parallel databases. Explain how to run parallel databases for big data? [7M]
- (b) Describe briefly about parallelizing individual operations and parallel query Optimization with relevant examples. [7M]

### UNIT – III

5. (a) Design the architecture of distributed databases. Discuss the advantages & disadvantages of a distributed database management system. [7M]
- (b) List the key differences between homogenous and heterogeneous distributed database management system. [4M]
- (c) State the types of data fragmentation. [3M]
6. (a) Explain about the levels of transparency and reference architecture for distributed database management system? [7M]
- (b) Determine purpose of distributed database access primitives in distributed databases and show how integrity constraints are used in distributed databases. [7M]

### UNIT – IV

7. (a) What is distributed query processing and state bank application for explaining of distributed query processing. [7M]
- (b) What is database fragmentation and explain where it is helpful for real time database applications? [4M]
- (c) Describe the framework for distributed database design? [3M]
8. (a) Discuss about distributed grouping and aggregation functions, using employee table(name,age,salary,department,designation,experience). [7M]
  - i. print total number of employees in an organization.
  - ii. print average of salaries of total employees.
  - iii. print minimum and maximum ages of employees.
  - iv. print employee details who belongs to same department.
- (b) Explain the process of transforming global queries into fragment queries. [4M]
- (c) Describe the role of fragments allocation in the design of database fragmentation? [3M]

### UNIT – V

9. (a) Explain the procedure for creation of join queries, general queries and non-join queries in a distributed DBMS? Write a SQL statement to prepare a list with salesman name, customer name and their cities for the salesman and customer who belongs to same city. [7M]  
Eg tables: salesman(salesman\_id, name,city)  
customer(cust\_name, cust\_id, city ,salesman\_id)
- (b) Discuss about indexing for text search in information retrieval. [4M]
- (c) Specify the importance of cost based query optimization with suitable example. [3M]
10. (a) Describe querying XML data and the procedure of efficient evaluation for XML queries [7M]
- (b) Explain about web search engine and managing text in a DBMS. [4M]
- (c) Discuss about joins queries and general queries in a distributed DBMS. [3M]

Hall Ticket No

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Question Paper Code: BCS005



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**ADVANCED DATABASE MANAGEMENT SYSTEM**  
(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Discuss in detail about entity relationship model and relational model? Consider the following information about a university database and create tables and relations for following entities.
  - i. Professors have an SSN, a name, an age, a rank, and a research specialty [7M]
  - ii. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.)
- (b) Explain the integrity issues in database design and give brief explanation of integrity constraints and create tables by using integrity constraints for [4M]
  - i. Employee (empno,name,office,age)
  - ii. Books(isbn,title,authors,publisher)
  - iii. Loan(empno, isbn,date).
- (c) Describe about structured data types and its operations in brief? [3M]
2. (a) Discuss the concepts of encapsulation, abstract data types and inheritance? Specify the data types for [7M]
  - i. employee(name,age,designation,salary,deptno)
  - ii. department (deptno, deptname, address)
- (b) State data definition language commands and data manipulation language commands? Write queries for following entities with attributes [4M]

Emp (eid: integer, ename: string, age: integer, salary: real)  
Works(eid: integer, did: integer, pcttime: integer)  
Dept(did: integer, dname: string, budget: real, managerid: integer)

  - i. Write an SQL statement to add John Doe as an employee with eid = 101, age = 32 and salary = 15, 000.
  - ii. Write an SQL statement to give every employee a 10 percent raise.
  - iii. Write an SQL statement to delete the Toy department.
- (c) Explain briefly about enhanced data model? [3M]

## UNIT – II

3. (a) Explain in detail the parallel databases and architecture of parallel databases? [8M]  
(b) State and differentiate the following partitioning techniques. [6M]  
    i. Hash partitioning  
    ii. Range partitioning
4. (a) Summarize the following operations that are parallelized using data partitioning? [7M]  
    i. Scanning  
    ii. Sorting  
    iii. join  
(b) Discuss how parallelism could be used in query processing and relational operation executions? [7M]

## UNIT – III

5. (a) What is meant by a distributed database management system and discuss the motivation in providing such a system? [7M]  
(b) Discuss about distributed database access primitives and Integrity constraints in distributed databases. Create a table for reservation system with integrity constraints for any attribute and violate the insertion. [4M]  
(c) Explain distribution transparency for read-only and update applications in distributed database management system? [3M]
6. (a) Explain component architecture for a distributed database management system? [7M]  
(b) Discriminate homogenous and heterogeneous distributed database management system? [7M]

## UNIT – IV

7. (a) Discuss about the following in detail with examples [7M]  
    i. distributed grouping  
    ii. aggregation functions  
    iii. parametric queries  
(b) Explain about the design of database fragmentation in detail for distributed database management system? [4M]  
(c) Describe fragments allocation in the design of database fragmentation? [3M]
8. (a) Explain briefly about Equivalence of transformations for queries in distributed query processing? [7M]  
(b) Discuss the framework for distributed database design and database fragmentation? [4M]  
(c) Describe the process of transforming global queries into fragment queries? [3M]

## UNIT – V

9. (a) Describe about Querying XML data and efficient evaluation of XML queries? [7M]  
(b) State the difference between query optimization and cost based query optimization? [4M]  
(c) Explain about web search engine and managing text in a DBMS? [3M]

10. (a) Explain about join queries in a distributed DBMS and write queries for following: [7M]
- i. Write a query to find the addresses (location\_id, street\_address, city, country\_name) of all the departments.
  - ii. Write a query to find the names (first\_name, last\_name), department ID and name of all the employees.
  - iii. Write a query to get the department name and number of employees in the department.
- (b) State the key difference between database management system and information retrieval systems? [4M]
- (c) Discuss about indexing for text search in information retrieval? [3M]

Hall Ticket No 

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Question Paper Code: BCS006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**CYBER SECURITY**

(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Describe different kinds of web attacks. List all the steps you will take for each kind of web attack. [7M]
- (b) Explain the n-tier web application architecture. Take an example portal and give all the steps to build the portal and also all the steps required to secure it. [4M]
- (c) Define web security forensic. Explain an example cyber security problem where forensic technology is successfully used to solve the problem. [3M]
2. (a) Define hash function. Explain an example situation where hash functions are successfully used in cyber forensics. [7M]
- (b) Assume you are building your college student registration system on IIS web server. List all the steps needed to build the web server. Also list all the steps needed to secure the webserver. [4M]
- (c) Assume you are asked to develop a database server for student registration system on oracle. List all the steps taken to build the server. Also list all the steps needed to secure the server. [3M]

**UNIT – II**

3. (a) Define a block cipher. Describe with an example all the modes of operations of block cipher. [8M]
- (b) Explain an example situation in which the RSA cryptography is applied but failed to provide the security. [6M]
4. (a) Alice wants to send the number 1267 to Bob using RSA cryptography. Give all the steps of encryption and decryption of the message. [7M]
- (b) Explain the challenges that are faced in successfully deploying web intrusion detection system. [7M]

### UNIT – III

5. (a) Write a java program which will encrypt a message with symmetric key and also write another java program which will decrypt the message with symmetric key. [6M]
- (b) List all the steps which track the clicks on the links of sent emails. [6M]
- (c) The architecture components linux, apache, mysql and php are often found installed on the same physical server. Why can this diminish the security posture of the application architecture. [2M]
6. (a) Explain all the important web server architecture security factors to be considered when communicating with external interface. [10M]
- (b) List all the steps to configure servlet container to use SSL. List all the login based servlet authentication provided by servlet container. [4M]

### UNIT – IV

7. (a) can a computer spoof a tcp connection to frame another computer in the same broadcast domain? If so, explain in detail how? If not, explain why not. [7M]
- (b) Compare and contrast hashing and encryption. Explain how hash will help in designing a password system. [4M]
- (c) It is given that file system size is 990MB. Each File System block has 4096bytes. How many File Sytem blocks are in each block group. What is the size of one block group. How many block groups exist. [3M]
8. (a) What step you will take to conclude that a URL is malicious. What steps will you take when you encounter a malicious URL. [7M]
- (b) List atleast 4 test cases for a finger print recognition software. [4M]
- (c) List the differences between biometrics and forensics. Is it possible to interact with a biometric device without touching it? [3M]

### UNIT – V

9. (a) Assume you are developing a website of a software company. List all the JDBC APIs and JDBC drivers used to develop the software. [7M]
- (b) Explain how proxy design pattern is used to design secure JDBC driver. Also explain how SSL tunneling is used in secure jdbc transmission. [4M]
- (c) List and explain all the sections of the electronic communication privacy act. Give example situation where a criminal is let free due to the drawbacks in electronic communication privacy act. [3M]
10. (a) Explain with example the secure jdbc. Write a program which demonstrates an application with secure JDBC. [7M]
- (b) Define digital evidence control. Take a cyber crime example situation and demonstrate evidence handling procedure to it. [4M]
- (c) List and explain all the laws of Indian evidence act. Give a situation where a criminal is let free due to drawbacks in the Indian evidence act. [3M]

Hall Ticket No

Question Paper Code: BCS006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**CYBER SECURITY**

(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Describe different kinds of web attacks .What is the procedure of each attack. [7M]  
(b) Explain the n-tier web application architecture with an example. [4M]  
(c) Define web security forensic lesson. [3M]
2. (a) What the concept of a web server. and their applications. [7M]  
(b) Describe the construction and working of IIS webserver. [4M]  
(c) Define a database server . Discuss the advantages of database server. [3M]

**UNIT – II**

3. (a) Define Public Key cryptography. Describe with a suitable example. [8M]  
(b) Explain with example THE RSA cryptography. [6M]
4. (a) Explain the concept of computer intrusion with an example. [7M]  
(b) Explain various digital laws and legislations regarding cyber crimes and how they are applicable with examples. [7M]

**UNIT – III**

5. (a) How do you define web hacking . [6M]  
(b) Explain with an example about applet security and discuss their features. [6M]  
(c) Explain about how servlet security can be implemented. [2M]
6. (a) Describe how email investigation takes place in different areas and explain the procedure in steps. [10M]  
(b) Explain any one Encryption and Decryption methods with suitable examples. [4M]



#### UNIT – IV

7. (a) Explain forensic analysis and advanced tools their advantages and disadvantages. [7M]  
(b) Define forensic ballistics. Give their applications in various areas of cyber crime. [4M]  
(c) Define finger print recognition. [3M]
8. (a) Explain the concept of hashing using an example. [7M]  
(b) Define digital certificates. [4M]  
(c) Explain how iris recognition is helpful in cyber security. [3M]

#### UNIT – V

9. (a) Explain with example secure JDBC. [7M]  
(b) Define Digital Evidence Control. [4M]  
(c) Explain Indian Evidence Act. [3M]
10. (a) Explain the electronic communication privacy act. [7M]  
(b) Explain in detail about legal policies related to cyber crime. [4M]  
(c) Explain cyber graffiti. [3M]

Hall Ticket No 

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Question Paper Code: BCS004



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DISTRIBUTED OPERATING SYSTEM**  
(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**  
**All Questions Carry Equal Marks**  
**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Differentiate Middleware and Distributed Operating Systems. [7M]  
(b) Describe hardware and software concepts [7M]
2. (a) Explain Remote procedure calls with appropriate examples. [7M]  
(b) Implement ATM networks with Diagrams. [7M]

**UNIT – II**

3. (a) Explain Election algorithm with appropriate Example [7M]  
(b) Describe Distributed deadlock prevention and detection. [7M]
4. (a) Implement the Bully algorithm with an example. [7M]  
(b) Explain Synchronization in Distributed System in detail. [7M]

**UNIT – III**

5. (a) Explain Scheduling in Distributed System with examples. [7M]  
(b) Describe Processors Allocation with examples. [7M]
6. (a) Describe Real Time Distributed Systems [7M]  
(b) Explain distributed file system implementation [7M]

**UNIT – IV**

7. (a) Explain Distributed shared memory . [7M]  
(b) Describe Consistency models with examples. [7M]
8. (a) Explain page based distributed shared memory . [7M]  
(b) Explain shared variables. [7M]

**UNIT – V**

- 9. (a) Explain process management in MACH. [7M]
- (b) Implement Communication mechanism in MACH. [7M]
- 10. (a) Implement UNIX emulation in MACH. [7M]
- (b) Why does Mach provide port sets, when it also provides threads? [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### DISTRIBUTED OPERATING SYSTEM (Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Explain the implementation of RPC in a distributed system. [7M]
- (b) Explain different communication protocol used for RPCs. [7M]
2. (a) What are the issues in client server binding? Explain how these issues handled? [7M]
- (b) Why are distributed Operating systems gaining popularity. [7M]

#### UNIT – II

3. (a) What is clock synchronization? Explain various clock synchronization algorithms. [7M]
- (b) Explain how Mutual Exclusion is implemented in distributed systems. [7M]
4. (a) Explain the Deadlock modeling. [7M]
- (b) Implement the ring algorithm with an example. [7M]

#### UNIT – III

5. (a) Explain Issues in designing a threads package. [7M]
- (b) Explain the desirable features of a good global scheduling algorithm. [7M]
6. (a) Explain various features of a good distributed file system. [7M]
- (b) Discuss distributed file system design in detail. [7M]

#### UNIT – IV

7. (a) Explain consistency model used in a distributed shared memory. [7M]
- (b) Suppose that two variables A and B are both located by accident on the same page of a page-based DSM system. However both of them are unshared variables. Is false sharing possible? Explain. [7M]
8. (a) Describe the role of distributed shared memory in distributed Operating Systems. [7M]
- (b) What is DSM? Explain the following shared memory multiprocessor in detail “Ring- Based Multiprocessors. [7M]

## UNIT – V

9. (a) Explain Design goals of Mach in Detail. [7M]  
(b) Explain the memory management techniques in MACH Distributed operating systems. [7M]
10. (a) Describe chief design features Mach Operating Systems . [7M]  
(b) Why does Mach provide only a single communication system call, mach\_msg? How is it used by clients and by clients by servers? [7M]

Hall Ticket No

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Question Paper Code: BCS208



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**SOFT COMPUTING**

(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

- (a) Define Neural Network. List out the models of different artificial neural networks and also write the differences between memory based learning and hebbian learning. [7M]

(b) What is radial basis function network? Give approximation properties of RBF networks. Also discuss the differences between RBF networks and multilayer perceptrons. [7M]
- (a) Show that the McCulloch-pitts formal model of a neuron may be approximated by a sigmoidal neuron (i.e., neuron using a sigmoid function with large synaptic weights). [8M]

(b) Unsupervised learning can be implemented in an off-line or on-line fashion. Discuss the physical implications of these two possibilities. [6M]

**UNIT – II**

- (a) What is associative memory? Explain it with reference to human brain. [4M]

(b) Draw and explain hardware model of continuous Hop-field network. [6M]

(c) Compare and contrast different associative memory networks. [4M]
- (a) State how travelling salesman problem can be solved using the Hop-field model. [10M]

(b) Define unsupervised learning. How it is different from supervised learning? Explain with an example. [4M]

**UNIT – III**

- (a) What are fuzzy sets? Explain any two fuzzy set operations and properties with examples. [5M]

(b) Write short notes on [9M]

  - Membership value assignments
  - Different structures for fuzzy if-then rule
  - fuzzy ordering
- (a) Discuss features of membership functions. Illustrate it with examples. [7M]

- (b) Define a specific triangle with three ordered angles. [7M]  
X:A=85° ≥ B=50° ≥ C=45°, where A+B+C=180°  
Determine membership values for each of the fuzzy triangles.  
i. Approximate isosceles triangle  
ii. Approximate right angle triangle

#### UNIT – IV

7. (a) Contrast expert systems and neural networks in terms of knowledge representation, knowledge acquisition, Give one domain in which the expert system approach would be more promising. Explain. [7M]  
(b) What is decomposition and aggregation of fuzzy rules? Illustrate with an example. [7M]
8. (a) Define operations in terms of arithmetic operations on  $\alpha$ -cuts which are a subject of interval analysis of classical mathematics. Explain these operations with examples. [7M]  
(b) Explain reflexivity, symmetry, transitivity and equivalence fuzzy relations with examples. [7M]

#### UNIT – V

9. (a) Define search space. Give a suitable example for the genetic algorithm principle “survival of the fittest”. [8M]  
(b) Simulate a genetic algorithm to minimize a function  $F(x) = x^2 + y^2$  where  $1 \leq x \leq 15$  and  $y \geq 3$  with  $x + y = 7$  [6M]
10. (a) List out various classifications of genetic algorithm. How hierarchical genetic algorithms are formed using parallel genetic algorithms? Explain. [5M]  
(b) Implement a parallel genetic algorithm for travelling salesman problem. [9M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**SOFT COMPUTING**

(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

### UNIT – I

1. (a) Consider a multilayer feed forward network, all the neurons of which operate in their linear regions. Justify the statement that such a network is equivalent to a single-layer feed forward network. [7M]
- (b) Define hebb's rule and delta rule. List the features that distinguish two rules from each other. [7M]
2. (a) List out various applications of neural networks. Explain how neural networks can be implemented in handwritten digit recognition application. [7M]
- (b) Consider the simple example of a network involving a single weight, for which the cost function is [7M]  

$$\mu(w) = k_1(w - w_0)^2 + k_2$$

Where  $w_0$ ,  $k_1$  and  $k_2$  are constants. A back-propagation algorithm with momentum is used to minimize  $\mu(w)$ .

Explore the way in which the inclusion of the momentum constant influences the learning process with particular reference to the number of epochs required for convergence versus  $\alpha$ .

### UNIT – II

3. (a) Explain the architecture of counter propagation networks and their training algorithms. [7M]
- (b) State how the Hop-field network may be used to maximize an objective function by recasting the objective as one to be minimized. [7M]
4. (a) Using suitable diagrams and equations explain the basic bidirectional associative memory configuration. Also describe its energy function. [7M]
- (b) Draw and explain the architecture of popular self-organizing maps. Derive the training algorithm of kohonen network. Also explain how SOMs can be used for data compression. [7M]



### UNIT – III

5. (a) Develop a reasonable membership function for a square, based on the geometric properties of a rectangle, for this problem use  $L$  as length of the longer side and  $l$  is the length of the smaller side. [7M]
- (b) Explain the following with example [7M]
- Fuzzy union
  - Fuzzy intersection
  - Fuzzy complement.
6. (a) What do you mean by defuzzification? Explain the following methods of defuzzification. [7M]
- Centroid method
  - Weighted average method
- (b) Compare and contrast between crisp variables and fuzzy variables. Give examples. [7M]

### UNIT – IV

7. (a) What are the four major steps in fuzzy rule-based model? Explain them. [7M]
- (b) How multivalued logic and fuzzy logic are related? Give brief description of the following [7M]
- unconditional and unqualified fuzzy proposition
  - Conditional and unqualified fuzzy proposition.
8. (a) With an example discuss fuzzy individual decision making and also explain the direct methods of fuzzy construction. [7M]
- (b) What is fuzzy compliment? What are the axioms to be satisfied so that a function can be used as fuzzy compliment? Check whether the function  $x+y-x.y$  can be used as a fuzzy union or not. [7M]

### UNIT – V

9. (a) Differentiate between genetic algorithm and genetic programming. Write short notes on tree based genetic programming. [7M]
- (b) Discuss the characteristics of genetic programming. With a computer program, explain the approach of genetic programming to scheduling algorithms. [7M]
10. (a) Mention some of the areas where genetic algorithms can be applied. How is fuzzy optimization performed? Illustrate with an example. [7M]
- (b) How genetic algorithms are related to internet? Discuss about selection of the degree of crossover and generation of the output set with an example. [7M]

Hall Ticket No 

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Question Paper Code: BCS201



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**WEB INTELLIGENT AND ALGORITHMS**  
(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Describe about Intelligent web applications. Challenges and limitations of the current web? [7M]  
(b) Define Page Rank, Intelligent Web Crawling and draw the architecture of InfoSpider Agent. [7M]
2. (a) What are the Concepts of distance and similarity, collaborative filtering, Recommendations based on similar users. [7M]  
(b) What type of site navigation can be created with Cascade Server? [7M]

**UNIT – II**

3. (a) Classify Different Types of Recommender Systems. [7M]
  - i. Hybrid Recommender System.
  - ii. Demographic based Recommender System.
- (b) Describe briefly intelligent web crawling. [7M]
4. (a) Extracting intelligence from tags, tag related metadata, tag generation? [7M]  
(b) Explain the ranking documents, precision and recall? [7M]

**UNIT – III**

5. (a) Explain Memory based and Model based Approach in Collaborative filtering? [7M]  
(b) What is Google Crawling and indexing? [7M]
6. (a) How Accuracy is an important factor in assessing the success of data mining? [7M]  
(b) What is the Factorization-based collaborative filtering? [7M]

**UNIT – IV**

7. (a) Explain about association rule mining techniques? [7M]  
(b) Write about the matching problem, adwords problem? [7M]

8. (a) Explain following Clustering Methods [7M]  
    i. Partitioning Method  
    ii. Grid-Based Method  
(b) What are some Web crawler tips to avoid crawler traps? [7M]

**UNIT – V**

9. (a) How is user interaction design related to user interface design? [7M]  
(b) Distinguish the On-line Algorithms versus Off-line Algorithms? [7M]
10. (a) Explain the Evaluation of Recommender Systems by Explaining F-Score, Recall and Precision? [7M]  
(b) Can we use Leveraging tags to improve inventory forecasting accuracy? Explain Briefly? [7M]

Hall Ticket No

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Question Paper Code: BCS201



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**WEB INTELLIGENT AND ALGORITHMS**  
(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) What is page Rank and page rank is used for search engine optimization explain briefly? [7M]  
(b) Describe about Intelligent web applications. What are its applications? [7M]
2. (a) What are the Concepts of distance and similarity, collaborative filtering, Recommendations based on similar users. [7M]  
(b) Describe the creating suggestions and recommendations. [7M]

**UNIT – II**

3. (a) How the Google PageRank Algorithm Works and also explain Tool PageRank and Real PageRank? [7M]  
(b) What are the major differences among web 1.0 , web 2.0 and web 3.0? [7M]
4. (a) Explain how many forms of tagging is there and the use of the tags? Working example of how intelligence is extracted from tags? [7M]  
(b) What is ranking, how ranking is done and describe two ranking models? [7M]

**UNIT – III**

5. (a) Differences between suggestions and recommendations? [7M]  
(b) What is web searching, indexing? [7M]
6. (a) Describe data mining methods of clustering, classifiers and association rule mining techniques? [7M]  
(b) Define Neighborhood based recommendation systems. [7M]

**UNIT – IV**

7. (a) What is recommendation system and describe the hybrid recommender system in detail? [7M]

- (b) Explain following recommender systems? [7M]  
i. Collaborative recommender system  
ii. Constraint based recommender system
8. (a) Explain the process of extracting intelligence from Blogs. [7M]  
(b) Write about ranking documents, precision and recall. [7M]

**UNIT – V**

9. (a) How to Extracting intelligence from wikis, message boards. [7M]  
(b) Define calorific value of fuel. Distinguish gross and net calorific value. [7M]
10. (a) Explain about Leveraging tags in detail? [7M]  
(b) Explain about Web 3.0 and the semantic web? [7M]

Hall Ticket No

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Question Paper Code: BCS703



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**RESEARCH METHODOLOGY**  
(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

**UNIT – I**

1. (a) Briefly describe the different steps involved in a research process. [7M]  
(b) What are the techniques involved in defining a research problem? [7M]
2. (a) What are the important concepts relating to research design? Explain. [7M]  
(b) What do you mean by 'Sample Design'? What points should be taken into consideration by a researcher in sample design for any research project? [7M]

**UNIT – II**

3. (a) What are the classifications of measurement scales? Explain with examples. [7M]  
(b) Enumerate the different methods of collecting data giving one example each. [7M]
4. (a) What are the important steps of data preparation process? Explain in detail. [7M]  
(b) Discuss about measures of central tendency and how they are useful in any research work. [7M]

**UNIT – III**

5. (a) Explain how sampling and statistical inference are useful for any research work. [7M]  
(b) What is testing of hypothesis? Explain how it is useful for illustrating a research problem with two examples. [7M]
6. (a) Write a short note on data collection through telephone [7M]  
(b) Write detailed notes on data collection and data analysis. [7M]

**UNIT – IV**

7. (a) Explain in detail each section in layout of research paper. [7M]  
(b) i. Mention the different types of reports, particularly pointing out the difference between a technical report and a popular report.  
ii. Describe, in brief the layout of a research report, covering all relevant points. [7M]
8. (a) Maintain the different types of interpretations particular pointing out the difference of a report and the interpretation? [7M]  
(b) Write different points will you keep in mind while preparing a research report? Explain? [7M]

**UNIT – V**

9. (a) Explain different types of intellectual property in detail. [7M]  
(b) Explain about International Organization, Agencies and Treaties. [7M]
10. (a) Explain why agencies responsible for intellectual property registration, with any two examples. [7M]  
(b) Analyze MC Donald's Corporation has filed a trademark application for Mc magic mixers for new condiments blends, will the mark is protectable if so explain. [7M]

Hall Ticket No

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Question Paper Code: BCS703



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### RESEARCH METHODOLOGY (Computer Science and Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. (a) What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem. Give suitable examples. [7M]
- (b) Discuss the format of thesis and dissertation. [7M]
2. (a) What is time series? Explain various components of time series. [7M]
- (b) Fit a straight line traced by the method of least squares for the following data. [7M]

Year	2005	2006	2007	2008	2009	2010	2011
Production (in 1000 of tons)	77	88	94	85	91	98	100

#### UNIT – II

3. (a) What are the various types of graphs used for presenting a frequency distribution. [7M]
- (b) Enumerate the different methods of collecting data giving one example each. [7M]
4. (a) Describe the steps in sample design. [7M]
- (b) A random sample of 200 measurements from an infinite population gave a mean value of 50 and a standard deviation of 9. Determine the 95% confidence interval for the mean value of the population. [7M]

#### UNIT – III

5. (a) Distinguish between correlation and regression. [7M]
- (b) Ten students got the following percentage of marks in the course principles of Economics and Statistics. Calculate the coefficient of Correlation. [7M]

Roll No.	1	2	3	4	5	6	7	8	9	10
Marks in Economics:	78	36	98	25	75	82	90	62	65	39
Marks in Statistics :	84	51	91	60	68	62	86	58	53	47



6. (a) The following information is obtained concerning an investigation of 50 ordinary shops of small size. [7M]

	Shops	Shops	
	In town	In villages	Total
Run by Men	17	18	35
Run by Women	3	12	15
Total	20	30	50

Can it be inferred that shops run by women are relatively more in villages than in towns? Use  $\chi^2$  test ( $\chi^2$  value for one degree of freedom at 5% level of significance is 3.84)

- (b) Classification according class intervals involve three main problems : [7M]
- How many classes should be there?
  - How to choose class limits?
  - How to determine class frequency?
- State how these problems should tackled by researcher?

#### UNIT – IV

7. (a) Explain interpretation is a fundamental component of Research Process? Explain why so? [7M]  
 (b) Describe the precautions that the researcher should take why interpreting is findings? [7M]
8. (a) Explain the significance of a research report and narrate various steps involved in writing such a report ? [7M]  
 (b) Write the different types of report particularly pointing out the difference between the technical report and a popular report? [7M]

#### UNIT – V

9. (a) Explain new developments in the copyright protect for following [7M]  
 Computer games, video games, piracy of software.  
 (b) Distinguish international trademark law and copy right law. [7M]
10. (a) Describe the principles governing while a purchased book is later sold to [7M]  
 (b) Explain the process patent application. [7M]

Hall Ticket No

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Question Paper Code: BES004



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**EMBEDDED SYSTEM ARCHITECTURE**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) List and describe four development models in which most embedded projects are based. [7M]  
(b) List and describe five different markets under which embedded systems commonly fall? Provide examples of four devices in each market. [7M]
2. (a) List and describe two types of ISA that fall under each of three ISA models? Give four real world processors that fall under the types of ISA? [7M]  
(b) Explain the instruction level parallelism with examples? [7M]

**UNIT – II**

3. (a) Explain the internal design of a processor with reference to the Von Neumann? [7M]  
(b) Define register? Describe the two most common types of registers? [7M]
4. (a) Explain the internal architecture of a Processor. [7M]  
(b) Discuss the Hardware components of embedded system and explain. [7M]

**UNIT – III**

5. (a) Construct and describe the memory hierarchy of an embedded system. [7M]  
(b) Describe the main differences between ROM, SRAM, DRAM memory Cells. [7M]
6. (a) Explain the differences between memory management unit and a memory controller? can one embedded system incorporate both why or why not? [7M]  
(b) List and describe the at least four cache swapping schemes ? [7M]

**UNIT – IV**

7. (a) Differentiate between the UDP and TCP ? Explain in detail? [7M]  
(b) Discuss the differences between the FTP client and FTP server ? what type of embedded devices would implement each? [7M]

8. (a) List and describe the four sub components that make up ppp software?What RFCS are associated with each? [7M]  
(b) Define HTTP ? Discuss what types of applications would incorporate an HTTP client or server. [7M]

**UNIT – V**

9. (a) Mention the six stages in creating an architecture ?Explain them. [7M]  
(b) Explain the process for documenting an architecture? How can a particular structure be documented. [7M]
10. (a) List and explain the four models under which testing techniques fall?within each of these models what are five types of testing that can occur? [7M]  
(b) Differentiate between the debugging and testing ?Explain in detail? [7M]

Hall Ticket No

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Question Paper Code: BES004



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**EMBEDDED SYSTEM ARCHITECTURE**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) What is OSI model? Explain the layers of OSI model? Give two examples of protocols under each layer. [7M]
- (b) List and describe three most common ISA models on which architectures are based? [7M]
2. (a) What is Van Neumann model ? what are the main elements defined by VN model? Explain? [7M]
- (b) Explain the differences between all embedded JVM's? What is an element of ESA? Explain with examples of architectural elements. [7M]

**UNIT – II**

3. (a) Illustrate and explain the factors to be considered while evaluating the processor for embedded system? [7M]
- (b) Explain various I/o devices in detail ? Mention the signals used by I/o devices for interrupting. [7M]
4. (a) List and discuss the six logical units used to classify input/ output Hardware. [7M]
- (b) Explain the various interrupt handling mechanisms? . [7M]

**UNIT – III**

5. (a) Explain board input/output that can transmit and receive data in parallel with example. [7M]
- (b) Define and describe the three categories under which board buses typically fall? [7M]
6. (a) List and describe three common bus arbitration schemes? [7M]
- (b) Explain the differences between level-1, level-2, level-3 cache? How do they all work together in a system. [7M]

#### UNIT – IV

7. (a) Explain the SMTP protocol in detail? [7M]
- (b) Explain the middleware with embedded system model? [7M]
8. (a) Explain the TCP/IP model relative to OSI model in detail with block diagram? [7M]
- (b) Discuss what type of programming languages would introduce a component at the application layer? Explain them. [7M]

#### UNIT – V

9. (a) Explain the process for analyzing and evaluating an architecture? Mention five real -world examples of each? [7M]
- (b) Discuss the main types of debugging tools? List and describe four real-world examples of each type of debugging tool? [7M]
10. (a) Define a preprocessor? Explain with real-world example of how a preprocessor is used in relation to programming language? [7M]
- (b) List some features that differentiate compiling needs in embedded systems versus in other types of computer systems? Explain in detail? [7M]

Hall Ticket No 

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Question Paper Code: BES210



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**EMBEDDED WIRELESS SENSOR NETWORK**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**  
**All Questions Carry Equal Marks**  
**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Relate sensor network with Ad-hoc network. [7M]  
(b) Prepare notes on single node architecture. [7M]
2. (a) With neat diagram, explain sensor network architecture. [7M]  
(b) What are various challenges of wireless sensor network. [7M]

**UNIT – II**

3. (a) With neat diagram explain the architecture of a sensor node. [7M]  
(b) Design a multihop sensor network with necessary source and sinks. [7M]
4. (a) Explain optimization goals and figure of merit of WSN. [7M]  
(b) Explain the innovative mechanisms to realize the characteristic requirement of wireless sensor network. [7M]

**UNIT – III**

5. (a) Briefly explain the components of Tiny OS. [7M]  
(b) Describe the TDMA mechanism and its advantages and disadvantages for sensor network implementation. [7M]
6. (a) Provide an example in which the data is routed using previous routing table and describe how a routing table changes over time. [7M]  
(b) What is synchronization? Show an implementation in which five nodes synchronize with each other. [7M]

**UNIT – IV**

7. (a) Explain co-operating objects. [7M]  
(b) Discuss about communication models. [7M]

8. (a) Explain adaptive system software. [7M]  
(b) Explain data management middleware. [7M]

**UNIT – V**

9. (a) Design a sensor network to maximize its lifetime and reduced energy consumption. [7M]  
(b) Write a case study for energy efficient environmental monitoring. [7M]
10. (a) Write a flowchart for any one application a sensor network. [7M]  
(b) Write a case study for inter vehicle communication. [7M]

Hall Ticket No 

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Question Paper Code: BES210



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**EMBEDDED WIRELESS SENSOR NETWORK**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**  
**All Questions Carry Equal Marks**  
**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Write about operational states of sensor node. [7M]  
(b) Show various mechanisms which form a typical part of WSN. [7M]
2. (a) Explain the various challenges and potential applications of wireless sensor networks. [7M]  
(b) Illustrate in detail about the various hardware components and their composition into functioning node of WSN. [7M]

**UNIT – II**

3. (a) What is WSN tunneling? [7M]  
(b) Explain the concept of gateway with different scenarios in WSN. [7M]
4. (a) Discuss about the power source of a sensor node. [7M]  
(b) Explain steps in detail to develop a wireless sensor network. [7M]

**UNIT – III**

5. (a) What role does the Split Control interface play in Tiny OS? [7M]  
(b) Write a simple application to continually increment a counter value and send to another mote where the process is repeated. [7M]
6. (a) What is an event-driven programming, and why is it critical for sensor network programming? [7M]  
(b) What issues arise when atomic blocks are improperly used? [7M]

**UNIT – IV**

7. (a) Discuss about group based approach. [7M]  
(b) Explain embedded WiSeNts. [7M]



8. (a) Briefly explain system architecture. [7M]  
(b) Explain programming models requirements and its state of art. [7M]

**UNIT – V**

9. (a) How do you create and maintain a list of active devices that are connected to WSN. [7M]  
(b) Write a case study for environmental monitoring in WSN. [7M]
10. (a) Describe data aggregation and the concept of tree data structures. [7M]  
(b) Write a case study for inter vehicle communication. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FPGA ARCHITECTURE AND APPLICATIONS**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain in detail about read only memories. [7M]  
(b) Describe the functional blocks of XCR3064XL CPLD. [7M]
2. (a) Distinguish between PLA and PAL. [7M]  
(b) Design of parallel adder using CPLD architecture. [7M]

**UNIT – II**

3. (a) List the applications of FPGA. [7M]  
(b) What are the various methodologies of FPGA? [7M]
4. (a) Realize switching function (2, 3, 4, 6, 7) using 2 input LUTs. [7M]  
(b) Explain in detail about programmable I/O blocks in FPGA. [7M]

**UNIT – III**

5. (a) Compare the XILINX XC 2000 and XC 3000 architectures. [7M]  
(b) Explain the functional blocks of XILINX XC 4000 architecture. [7M]
6. (a) Explain the architecture of XILINX XC 3000 architecture. [7M]  
(b) Why SRAM based FPGAs are popular when compared to other types? [7M]

**UNIT – IV**

7. (a) Discuss the concept of ACT 2 architecture. [7M]  
(b) Relate Shannon expansion theorem in ACT architectures. [7M]
8. (a) With neat diagram explain the functional blocks of ACT 3 architecture. [7M]  
(b) Describe the functionality of ACT 2 architecture. [7M]

## UNIT – V

9. (a) Design a counter using suitable programmable logic device. [7M]  
(b) Describe the operation of fast video controller for a robot manipulator. [7M]
10. (a) Explain the operation of fast DMA controller. [7M]  
(b) Design the accumulator using ACT architectures. [7M]

Hall Ticket No

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Question Paper Code: BES005



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FPGA ARCHITECTURE AND APPLICATIONS**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain in detail about CPLD architectures. [7M]  
(b) Design a 1 bit magnitude comparator using PROM. [7M]
2. (a) Mention the features of generic array logic over PLDs. [7M]  
(b) Describe the functional blocks of XCR3064XL CPLD. [7M]

**UNIT – II**

3. (a) List the different components of FPGA. [7M]  
(b) Describe the function of programming interconnects in FPGA. [7M]
4. (a) Discuss the different programming technologies in FPGA. [7M]  
(b) Explain in detail about programmable logic blocks in FPGA. [7M]

**UNIT – III**

5. (a) Draw the simplified block diagram for Xilinx XC4000 series CLB. [7M]  
(b) With neat diagram, discuss the function of XILINX XC 2000 architecture. [7M]
6. (a) Why SRAM based FPGAs are popular when compared to other types? [7M]  
(b) Explain the architecture of XILINX XC 3000 architecture. [7M]

**UNIT – IV**

7. (a) Discuss the features of ACT 3 architecture. [7M]  
(b) Discuss the concept of Shannon expansion theorem in ACT architectures. [7M]
8. (a) Explain the functional blocks of ACT 2 architecture. [7M]  
(b) Describe the functionality of ACT 1 architecture. [7M]

## UNIT – V

9. (a) Design a synchronous counter using ACT devices. [7M]  
(b) Discuss the concept of position tracker in robot manipulator. [7M]
10. (a) Mention the design issues of ACT architectures. [7M]  
(b) Design a adder using ACT architectures. [7M]

Hall Ticket No

Question Paper Code: BES006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**INTERNET OF THINGS AND EMBEDDED SYSTEMS**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Define phases and foundation, policy of internet of things? [7M]  
(b) Describe various Communication technologies used in IOT? [7M]
2. (a) Explain the Control units used in internet of things? [7M]  
(b) List out the Challenges and Issues in internet of things? [7M]

**UNIT – II**

3. (a) Explain about protocols software and debugging tools used in IOT environment? [7M]  
(b) Summarize the RF links and mobile internet used in IOT environment? [7M]
4. (a) Describe buffer and timer management used in IOT? [7M]  
(b) Evaluate table access routines and other data structures used in IOT? [7M]

**UNIT – III**

5. (a) Analyze storing and restoring configuration using microcontroller in IOT environment? [7M]  
(b) Distinguish CLI based management and HTTP Management? [7M]
6. (a) Describe Clustering of things in IOT architecture? [7M]  
(b) Summarize concepts of data synchronization used in IOT? [7M]

**UNIT – IV**

7. (a) Explain the concept of agility and autonomy and how it is enabled in IOT? [7M]  
(b) Sketch the design of IOT and its software agents? [7M]
8. (a) Describe sensors and actuator technologies and middle ware in network society of IOT? [7M]  
(b) Summarize the set up from micro controller to cloud in IOT? [7M]

## UNIT – V

9. (a) Explain about Web enabling constrained devices in IOT? [7M]  
(b) Classify Middleware technologies needed for DiY internet of things? [7M]
10. (a) Explain Case study – Open Source e-Health sensor platform? [7M]  
(b) Summarize the agents of behavior of objects in IOT ? [7M]

Hall Ticket No

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Question Paper Code: BES006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**INTERNET OF THINGS AND EMBEDDED SYSTEMS**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Describe communication modules used in IOT ? [7M]  
(b) Define the concept of security and privacy IOT? [7M]
2. (a) Explain the Evolution from RFID based EPC network to agent based IOT? [7M]  
(b) Classify the various architectures used in IOT environment? [7M]

**UNIT – II**

3. (a) Distinguish between zigbee and Wi-Fi technology modules? [7M]  
(b) Illustrate the context of EURIDICE - Business Impact in an IOT? [7M]
4. (a) Explain boot and post boot configuration in microcontroller IOT ? [7M]  
(b) Identify the technical requirements satisfying the new demands of production in IOT? [7M]

**UNIT – III**

5. (a) Discuss the data structures used in an IOT? [7M]  
(b) Explain the debugging tools used in IOT environment? [7M]
6. (a) Describe Di-Y in the network society of an IOT ? [7M]  
(b) Sketch the design of an IOT architecture ? [7M]

**UNIT – IV**

7. (a) Explain briefly the application of ontology engineering in internet of things? [7M]  
(b) List out various software agents in an IOT? [7M]
8. (a) Explain about Web enabling constrained devices in IOT? [7M]  
(b) Define CLI based and HTTP based Protocol management in an IOT? [7M]



## UNIT – V

9. (a) Design REST full Smart Things and web enabling constrained devices in IOT environment? [7M]  
(b) Explain the concept of data synchronization used in IOT? [7M]
10. (a) Describe the case study of be close-elderly monitoring in an IOT? [7M]  
(b) Summarize the set up from micro controller to cloud in IOT? [7M]

Hall Ticket No

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Question Paper Code: BES214



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**Embedded Real Time Operating Systems**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Define RTOS. What are the key characteristics of an RTOS. [7M]  
(b) Explain file I/O functions: Lseek, open, Read, Write. [7M]
2. (a) What are OS services? Explain the structures of user and supervisory mode. [7M]  
(b) What is a kernel. Explain the Kernel services in an operating system. [7M]

**UNIT – II**

3. (a) Explain the scheduling algorithms to a weighted round robin approach with an example? [7M]  
(b) What is meant by scheduling mechanism? List any 4 scheduling algorithms and explain one of them with example? [7M]
4. (a) What are the different types of scheduling strategies used in RTOS? Explain briefly? [7M]  
(b) Define scheduler. Explain any scheduling algorithm? [7M]

**UNIT – III**

5. (a) Define scheduler. Explain any scheduling algorithm. [7M]  
(b) Define Semaphore. Explain the uses of Semaphore. [7M]
6. (a) Explain the following [7M]
  - i. Dead lock
  - ii. Message queue  
(b) Define the table for kernel services in an operating system with functions and actions. [7M]

**UNIT – IV**

7. (a) What are exceptions and interrupts? Explain the applications of exceptions and interrupts. [7M]  
(b) Explain the steps in servicing the timer interrupt. [7M]

- 8. (a) Explain the Interrupt service routines in an RTOS. [7M]
- (b) Explain the following [7M]
  - i. Recursive locking
  - ii. Pipe states

**UNIT – V**

- 9. (a) What are the important features of  $V_x$  Works for a sophisticated RTOS. [7M]
- (b) Define porting of RT Linux .Discuss general requirements of processor to port RT Linux along with hardware/software architecture. [7M]
- 10. (a) Explain the following [7M]
  - i. Memory layout in  $V_x$  Works
  - ii. Task Priority levels in  $V_x$  Works
- (b) Illustrate two examples for RTOS Image Processing. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**Embedded Real Time Operating Systems**  
(Embedded Systems)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain [7M]
  - i. fork
  - ii. vfork
  - iii. exit
  - iv. wait
  - v. waitpid
- (b) Write about the kernel services in an OS. [7M]
2. (a) Explain file I/O functions: Lseek, open, Read, Write. [7M]
- (b) What are the basic operating system services available? Explain how to perform memory management for a specific operating system. [7M]

**UNIT – II**

3. (a) Define scheduler. Explain any scheduling algorithm? [7M]
- (b) What are the various RTOS task scheduling models available? Explain any one of them in details? [7M]
4. (a) Explain the message queue and different states in queue? [7M]
- (b) Explain briefly about semaphores with examples? [7M]

**UNIT – III**

5. (a) Define the table for kernel services in an operating system with functions and actions. [7M]
- (b) Explain the event registers and signals with examples. [7M]
6. (a) Differentiate process and thread and define task and explain with diagram all the five states of task [7M]
- (b) Explain the basics I/O concepts with examples. [7M]

#### UNIT – IV

7. (a) What are the applications of exceptions and interrupts in RTOS. [7M]  
(b) Explain the exceptions and what is the process of handling exceptions? [7M]
8. (a) Explain the interrupts, spurious interrupts with examples . [7M]  
(b) Explain the Interrupt service routines in an RTOS [7M]

#### UNIT – V

9. (a) Explain all the specifications of Hardware architecture of ACVM system. [7M]  
(b) Draw and explain the architecture for Air Traffic Control(ATC). [7M]
10. (a) Illustrate the block diagram of Automatic Chocolate Vending Machine System(ACVM) [7M]  
(b) Define porting of RT Linux .Discuss general requirements of processor to port RT Linux along with hardware/software architecture. [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DC to AC Converters**  
**(Power Electronics and Electric Drives)**

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

### UNIT – I

- Explain the operation of 3 phase bridge inverter for 180 degree mode of operation with aid of relevant phase and line voltage waveforms [7M]
  - A single phase full bridge inverter has rms value of fundamental component of output voltage with single pulse width modulation equal to 110V. Compute the pulse width required and the rms value of output voltage in case dc source voltage is 220V. [7M]
- Discuss the principle of working of a single phase full bridge inverter with an appropriate circuit diagram and draw phase and line voltage waveforms on the assumption that each thyristors conducts for  $120^\circ$  and the resistive load is star connected. [7M]
  - A single-phase bridge Inverter feeds an R-L-C series load with  $R=3$ ,  $L=6\text{mH}$  &  $C=15\text{F}$ . The output frequency is 120Hz, supply voltage being 180V. Express the output voltage in terms of Fourier series & determine, [7M]
    - RMS values of thyristor current load current.
    - Current at the instant of commutation considering up to 7th harmonics only.

### UNIT – II

- Describe working of series resonant inverters with unidirectional switches. [7M]
  - Explain operation of full bridge resonant inverters and draw the waveforms. [7M]
- Write short notes on the following: [7M]
    - Parallel resonant inverters
    - Class E inverter and rectifier
  - Evaluate inductance and capacitance for a zero current switching inverter. [7M]

### UNIT – III

- Describe the concept of multilevel inverters with neat diagram and waveforms. [7M]
  - Explain the function of capacitors used in multilevel inverters and how these capacitor values are selected for proper operation. [7M]

6. (a) Categorize the effects of multilevel inverters on switch stress and how these effects are eliminated with conventional elements. [7M]  
(b) Explain the process for selection of conventional elements to reduce the effects. [7M]

**UNIT – IV**

7. (a) Explain the following: [7M]  
i. fly back converter  
ii. forward converter  
iii. push pull converter  
(b) Describe the classifications of DC power supplies ,features and applications. [7M]
8. (a) Describe the operation of half bridge and full bridge converters and write the advantages. [7M]  
(b) Explain the operation of bidirectional power supplies and applications. [7M]

**UNIT – V**

9. (a) Describe about uninterruptible power supplies and applications. [7M]  
(b) Explain the following: [7M]  
i. power line disturbances  
ii. power conditioner  
iii. multistage conversions
10. (a) Explain about switched mode ac power supplies and resonant ac power supplies. [7M]  
(b) Describe the classifications of AC power supplies ,features and applications. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DC to AC Converters**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

- Explain the operation of 3 phase bridge inverter for 120 degree mode of operation with aid of relevant phase and line voltage waveforms. [7M]
  - A single phase full bridge inverter has a resistive load of  $R = 10\Omega$  and the input voltage  $V_{dc}$  of 100 V. Find the average output voltage and rms output voltage at fundamental frequency. [7M]
- Discuss the principle of working of a three phase bridge inverter with an appropriate circuit diagram and draw phase and line voltage waveforms on the assumption that each thyristors conducts for  $180^\circ$  and the resistive load is star connected. [7M]
  - A single phase full-bridge inverter has RLC load of  $R = 4\Omega$ ,  $L = 35\text{mH}$  and  $C = 155\mu\text{F}$ . The dc input voltage of 230V and the output frequency is 50 Hz. Find the expression for load current upto fifth harmonic. Also calculate rms value of all the (fundamental, harmonic) current components. [7M]

**UNIT – II**

- Describe working of series resonant inverters with bidirectional switches. [7M]
  - Explain operation of half bridge resonant inverters and draw the waveforms. [7M]
- Write short notes on the following: [7M]
    - L type ZCS resonant converter
    - M type ZCS resonant converter
  - Explain the operation of two quadrant ZVS resonant converter. [7M]

**UNIT – III**

- Explain the effect of multilevel inverters on AC motors with neat diagram and waveforms. [7M]
  - Describe which multilevel inverter is most suitable for the proper operation of synchronous motor speed control? [7M]



6. (a) Distinguish sinusoidal pulse width modulation and space vector pulse width modulation techniques in multilevel inverters with neat waveforms. [7M]  
(b) Explain the principle ,features and applications of multilevel inverters. [7M]

#### UNIT – IV

7. (a) Explain the following: [7M]  
i. Half bridge converter  
ii. Full bridge converter  
(b) Explain the operation of fly back converters , push pull converter and list the advantages. [7M]
8. (a) Explain the operation of forward converter and resonant dc power supply. [7M]  
(b) Describe the classifications of DC power supplies ,features and applications. [7M]

#### UNIT – V

9. (a) Explain the following: [7M]  
i. Bidirectional ac power supplies  
ii. Control circuits  
iii. multistage conversions  
(b) Explain about switched mode ac power supplies and uninterrupt power supplies and applications [7M]
10. (a) Explain about power line disturbances , power conditioner and resonant AC power supplies.[7M]  
(b) Describe the classifications of AC power supplies ,bidirectional ac power supplies features and applications. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FLEXIBLE AC TRANSMISSION SYSTEMS**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

- (a) Explain importance of controllable parameters basic types of FACTS controllers. [7M]  
(b) Explain transmission inter connections power flow in an AC system. [7M]
- (a) Explain loading capability limits, dynamic stability considerations of FACTS controllers. [7M]  
(b) What are the advantages, disadvantages and applications from FACTS controllers. [7M]

**UNIT – II**

- (a) Explain the design of SVC voltage regulator. Also discuss the influence of SVC on system voltage. [7M]  
(b) Discuss in detail the effect of SVC for the enhancement of transient stability. [7M]
- (a) Discuss in detail about the role of SVC in improving the stability limit and enhancing the power system damping. [7M]  
(b) Derive and explain the series and shunt compensation of symmetrical transmission lines. [7M]

**UNIT – III**

- (a) Explain midpoint voltage regulation of Static shunt compensation. [7M]  
(b) Explain improvement of transient stability of Static shunt compensation. [7M]
- (a) Explain power oscillation damping of Static shunt compensation. [7M]  
(b) Explain Methods of controllable VAR generation. [7M]

**UNIT – IV**

- (a) Explain the working of STATCOM with a neat sketch. In what way it differs from SVC? [7M]  
(b) Explain the operation of STATCOM with its V-I characteristics. [7M]

8. (a) Explain the performance of VSC based STATCOM. [7M]  
(b) Describe the modeling of UPFC for power flow and transient stability studies [7M]

**UNIT – V**

9. (a) Explain the principle of operation of TCSC. Also discuss the different modes of TCSC. [7M]  
(b) Explain the effect of TCSC for the enhancement of system damping. [7M]
10. (a) Explain power oscillation damping and functional requirements of GTO thyristor controlled series capacitor (GSC). [7M]  
(b) Explain power oscillation damping and functional requirements of thyristor switched series capacitor (TSSC) . [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FLEXIBLE AC TRANSMISSION SYSTEMS**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Distinguish between load compensation and system compensation. [7M]  
(b) Explain the need of reactive power control in electrical power transmission lines? [7M]
2. (a) Explain the reactive power compensation at the sending, mid-point and receiving ends of the transmission lines. [7M]  
(b) Explain loading capability limits of FACTS controllers. [7M]

**UNIT – II**

3. (a) Explain the comparison of current source converters with voltage source converters. [7M]  
(b) Discuss in detail about the role of SVC in improving the stability limit and enhancing the power system damping. [7M]
4. (a) Describe the construction and operating characteristics of synchronous condensers. [7M]  
(b) Derive and explain the series and shunt compensation of symmetrical transmission lines. [7M]

**UNIT – III**

5. (a) Explain switching converter type VAR generator. [7M]  
(b) Explain hybrid VAR generator. [7M]
6. (a) Explain voltage instability prevention in Static shunt compensation. [7M]  
(b) Explain the controller interactions between multiple SVCs (SVC-SVC) in a large power system. [7M]

**UNIT – IV**

7. (a) Explain the power transfer capability of UPFC and compare its capabilities with other FACTS controllers. [7M]  
(b) Describe the construction of UPFC with a block diagram and its characteristics with phasor diagrams. [7M]

8. (a) Explain the operation of STATCOM with its V-I characteristics. [7M]  
(b) Explain the performance of VSC based STATCOM. [7M]

**UNIT – V**

9. (a) Describe the variable reactance model of TCSC. [7M]  
(b) Explain the different modes of operation of TCSC. [7M]
10. (a) Explain in detail the applications of thyristor controlled series capacitor. [7M]  
(b) How TCSC is used for the improvement of the stability of a system. [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### INTELLIGENT CONTROLLERS (Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Describe some attractive features of the biological neural network that make it superior to the most sophisticated Artificial Intelligence computer system for pattern recognition tasks. [7M]
- (b) What are the main differences among the three models of Artificial Neuron ,namely, McCulloch-Pitts, perceptron, and Adaline with their Topology, give a few basic topological structures of artificial neural networks. [7M]
2. (a) Identify supervised and unsupervised basic learning laws and compare Least mean square (LMS), perceptron and delta learning laws. [7M]
- (b) Design networks using M\_P neurons to realize the following logic functions [7M]  
Using +1 or – 1 for weights.
  - i.  $s(a_1, a_2, a_3) = a_1 a_3 + a_2 a_3 + a_1(\bar{a}_2) a_3(\bar{a}_3)$
  - ii.  $s(a_1, a_2, a_3) = a_1 a_2 a_3$

#### UNIT – II

3. (a) Explain Three types of Activation functions in ANN with their mathematical properties involving Sigmoid functions [7M]
- (b) Explain INSTAR (Winner-take-all) and outstar learning laws with mathematical model and diagrams. [7M]
4. (a) What do you understand by [7M]
  - i. Cohen- Grossberg Theorem
  - ii. Cohen –Grossberg –Kosko theorem
  - iii. Adaptive bidirectional associative memory theorem
- (b) Consider a stochastic unit with bipolar [-1,1] output function. The probability distribution for the unit is given by [7M]  
 $P(s=1/x) = 1/(1+\exp(-2tx))$ . If the learning of the stochastic unit is based on gradient descent on the error between the desired and the average output, show that the resulting learning law is the same as the learning law obtained using delta learning for a deterministic unit with hyperbolic tangent as the output function

### UNIT – III

5. (a) Draw a generalized flow chart for the design of FLC. Illustrate the formation of rules and decision making logic with the help of a case study [7M]
- (b) What is Fuzzification? Illustrate the procedure with the help of an Example. [7M]
6. (a) What are the common methods of defuzzification ? Illustrate the procedure with the help of an Example [7M]
- (b) Let  $A = ((x_1, 0.5), (x_2, 0.7), (x_3, 0))$  and  $B = (x_1, 0.8), (x_2, 0.2), (x_3, 1)$  are fuzzy sets with associated membership values. Find  $A \cup B(x_1), A \cup B(x_2), A \cup B(x_3)$  [7M]

### UNIT – IV

7. (a) Name and describe the main features of Genetic Algorithm(GA). [7M]
- (b) A budget airline company operates 3 planes and employs 5 cabin crews. Only one crew can operate on any plane on a single day and each crew cannot work for more than two days in a row. The company uses all planes everyday. A genetic algorithm is used to work out the best combination of crews on any particular day, Suggest [7M]
- Chromosome
  - Alphabet
  - fitness function for this problem
8. (a) Suppose a genetic algorithm uses chromosomes of the form  $x = abcdefgh$  with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual  $x$  be calculated as: [7M]
- $$f(x) = (a + b) - (c + d) + (e + f) - (g + h)$$
- and let the initial population consist of four individuals with the following chromosomes:
- $x_1 = 6\ 5\ 4\ 1\ 3\ 5\ 3\ 2$
- $x_2 = 8\ 7\ 1\ 2\ 6\ 6\ 0\ 1$
- $x_3 = 2\ 3\ 9\ 2\ 1\ 2\ 8\ 5$
- $x_4 = 4\ 1\ 8\ 5\ 2\ 0\ 9\ 4$
- Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last.
- (b) Consider the problem of finding the shortest route through several cities, such that each city is visited only once and in the end return to the starting city (the Travelling Salesman problem). Suppose that in order to solve this problem we use a genetic algorithm, in which genes represent links between pairs of cities. For example, a link between London and Paris is represented by a single gene 'LP'. Let also assume that the direction in which we travel is not important, so that  $LP = PL$ . How many genes will be used in a chromosome of each individual if the number of cities is 10? [7M]

### UNIT – V

9. (a) How will you apply artificial Neural Networks in Pattern Classification [7M]
- Recognition of Olympic symbols
  - Recognition of printed Characters
  - Making an opening bid in Contract Bridge Game

- (b) How will you apply Associate memories [7M]
- i. Image pattern recall
  - ii. Content addressable memory
  - iii. Information retrieval

10. (a) How will you apply NN optimization to [7M]
- i. Graph bipartition Problem
  - ii. Linear Programming Problem
  - iii. Travelling salesman problem
  - iv. Smoothing images with discontinuities

- (b) How will you apply NN to [7M]
- i. Vector quantization
  - ii. Control Applications
  - iii. Decision Making



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# INSTITUTE OF AERONAUTICAL ENGINEERING

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## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### INTELLIGENT CONTROLLERS (Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Explain briefly the terms cell body, axon, synapse, dendrite, and neuron with reference to biological Neural Network. [7M]
- (b) Draw a block diagram each to describe [7M]
  - i. supervised learning
  - ii. unsupervised learning
  - iii. Reinforcement learning
  - iv. competitive learning
2. (a) Enumerate all the sixteen steps with Equations for implementing a Back Propagation algorithm using a computational flow chart. [7M]
- (b) Prove that XOR function does not have a Linear separation Law. Draw an ANN for XOR problem. [7M]

#### UNIT – II

3. (a) Draw a block diagram each to describe [7M]
  - i. supervised learning
  - ii. unsupervised learning
  - iii. Reinforcement learning
  - iv. competitive learning
- (b)
  - i. Prove that XOR function does not have a linear separation law [7M]
  - ii. Design NN using MP neurons to realize the following logic function using +, - 1 for the weights.  
 $s(a_1, a_2, a_3) = a_1 a_2 a_3$
4. (a) Compare the performance of a computer and that of a biological network in terms of speed of processing, size and complexity, storage, format tolerance and control mechanism [7M]
- (b)
  - i. What are the merits and demerits of supervised and unsupervised learning? [7M]
  - ii. List the features that distinguish Delta rule and Hebb's rule.

### UNIT – III

5. (a) Given Two universe of discourse  $U_1=U_2=(1,2,\dots,10)$  and Two fuzzy sets (numbers) defined by “Approximately 2”  $=0.5/1+1/2+0.5/3$  and “Approximately 4”  $=0.8/2+0.9/3+1/4$ . It is desired to find “approximately 8” [7M]
- (b) Consider Two fuzzy sets  $A_1=0.2/x_1+0.9/x_2$  and  $A_2=0.3/y_1+0.5/y_2+1/y_3$ . Determine the fuzzy relation between these sets. [7M]
6. (a) Consider two fuzzy relations  $R=[0.6\ 0.8]$  and  $[0.7\ 0.9]$   $S=[0.3\ 0.1][0.2\ 0.8]$  it is desired to evaluate  $RoS$  and  $SoR$  where  $XoY$  is max min composition [7M]
- (b) Describe two common methods of fuzzy logic Stability Lyapunov Stability Stability via Interval matrix Method. [7M]

### UNIT – IV

7. (a) Define the terms chromosome, fitness function, crossover and mutation as used in genetic algorithms. Explain how genetic algorithms work, in English or in pseudocode. [7M]
- (b) A genetic algorithm is to be used to evolve a binary string of length  $n$  containing only 1s. The initial population is a randomly generated set of binary strings of length  $n$ . [7M]  
Give a suitable fitness function for this problem.
8. (a) Suppose the problem is to evolve a binary string of length  $n$  which is symmetric. If the string positions are numbered from 0, then a symmetric string will have a 1 in position  $i$  if and only if there is a 1 in position  $(n-1)-i$ . For example, 001100 is symmetric since it has a 1 at index 2 and a 1 at index  $(6-1)-2 = 3$ . Similarly, 110011 is symmetric, and 011011 is not. The initial population is a randomly generated set of binary strings of length  $n$ , where  $n$  is an even number. [7M]  
Give a suitable fitness function for this problem.
- (b) In the above problem [7M]  
Will the offspring of parents with a high fitness value generally also have a high fitness value, given your fitness function? Explain your answer  
If the population size in a genetic algorithm is restricted to 1, what search algorithm does it correspond to? Explain your answer

### UNIT – V

9. (a) How will you apply NN to following speech applications [7M]
- Net Talk
  - Phonic Typewriter
  - Vowel classification
  - Recognition of consonant (CV) segments
  - Recognition of stop CV utterances in Indian Languages
- (b) How will you apply NN to following Image Processing Applications [7M]
- Recognition of handwritten digits
  - Image segmentation
  - Texture classification and segmentation

10. (a) How will you apply Fuzzy Logic to [7M]
- i. Predictive constrained control
  - ii. PID control
  - iii. Washing machines
  - iv. Air conditioning control
- (b) How will you apply Fuzzy Logic to Integrated Modern Control involving [7M]
- i. Supervision
  - ii. Local Control
  - iii. Optimization
  - iv. Monitoring

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**POWER ELECTRONIC CONTROL OF AC DRIVES**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

**UNIT – I**

- (a) Explain induction motor characteristics in constant torque and field weakening regions. [7M]

(b) What happens to the performance of AC motor if the stator voltage control technique is adopted with frequency being constant. [7M]
- (a) A three phase SCIM drives a blower type load. No load rotational losses are negligible. Show that rotor current is maximum when the motor runs at a slip of 1/3. Find also an expression for maximum rotor current. [7M]

(b) Explain speed torque characteristics with variable voltage operation, variable frequency operation, constant v/f operation and variable stator current operation. [7M]

**UNIT – II**

- (a) Explain the operation of these phase voltage source inverter fed these induction motor drive with 180° conduction with the help of circuit diagram and waveforms. Also sketch speed-torque characteristics for sub-synchronous speeds? [7M]

(b) Using 3-phase solid state AC voltage controllers explain clearly how it is possible to achieve 4-quadrant operation of 3-phase induction motors. [7M]
- (a) Draw a closed loop block diagram for the 4 quadrant operation of 3 induction motor speed control technique. Mention the merits of the above method of speed control. [7M]

(b) A 3-phase, 400V, 50Hz, 4-pole, 1440 rpm delta connected squirrel cage induction motor has a full load torque of 48.13 N-m. Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate the motor torque at 1200rpm. [7M]

**UNIT – III**

- (a) Describe vector control with respect to induction motor? Explain the operation of induction motor when direct method of vector control is adopted. [7M]

(b) Draw the speed-torque characteristics of a rotor resistance controlled induction motor and explain the effect of rotor resistance variation. [7M]

6. (a) Draw and explain closed loop operation for a static Kramer controlled drive. [7M]
- (b) A 440V, 50Hz, 6 pole, 970rpm star connected 3-ph wound rotor motor has the following parameters referred to stator.  $R_s=0.1$  ohm,  $R_r=0.08$  ohm,  $X_s=0.3$  ohm,  $X_r=0.4$  ohm, stator to rotor turns ratio is 2. Motor speed is controlled by static scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Max. value of firing angle 165 deg, calculate [7M]
- transformer turns ratio
  - torque for a speed of 780rpm and  $\alpha=140$  degree.

#### UNIT – IV

7. (a) Discuss different control strategies of synchronous motor with reference to its characteristics. [7M]
- (b) Draw and explain the block diagram of a closed loop synchronous motor drive fed from VSI.[7M]
8. (a) Describe self-controlled and a loop commutated inverter controlled synchronous motor drives in detail and compare them. [7M]
- (b) Describe the flux weakening algorithm with constant torque mode controller and flux weakening controller. [7M]

#### UNIT – V

9. (a) Discuss the working of a three-phase BLDC motor drive when fed from voltage source inverter on closed loop operation. Draw neat circuit diagram. [7M]
- (b) Write short notes on Variable reluctance motor drive. [7M]
10. (a) Discuss the working of sinusoidal type of BLDC motor drive. [7M]
- (b) Explain the principle of operation of servo drive and its applications. [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### POWER ELECTRONIC CONTROL OF AC DRIVES (Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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#### UNIT – I

- Sketch the mechanical characteristics of a three phase induction motor with V/f method. [7M]
  - Explain the speed torque characteristics in constant torque and field weakening region. [7M]
- Explain the induction motor characteristics with variable stator current operation. [7M]
  - A 3-ph 20KW, 4-pole, 50Hz, 400V delta connected induction motor has the following parameters per phase  $R_1=0.6$  ohm,  $R_2=0.4$  ohm,  $X_1=X_2=1.6$  ohm. If magnetizing reactance is neglected and operated at 200V, 25Hz with DOL starting. Calculate the current and power factor at the instant of starting and under the maximum torque conditions. Compare the results. [7M]

#### UNIT – II

- Explain the operation of three-phase star-connected squirrel cage induction motor when fed from a three phase A.C. controllers for its starting and speed control purpose. Give neat circuit diagram, necessary waveforms and speed-torque characteristics. [7M]
  - Explain how speed and flux control in current fed inverter drive can be achieved by Volts / Hertz control. [7M]
- Explain how voltage and frequency are varied in voltage source inverter fed induction motor drives. [7M]
  - At 50 Hz the synchronous speed and full load speed are 1500 rpm and 370 rpm respectively. Calculate the approximate value speed for a frequency of 30 Hz and 80% of full load torque for inverter fed induction motor drive. [7M]

#### UNIT – III

- Discuss the working of three phase slip-ring induction motor when static Scheribus scheme is employed for its speed control. Draw a neat circuit, speed-torque characteristics and bring out salient features of this drive. [7M]

- (b) Discuss in detail the following vector control methods of induction motor drive: [7M]  
i. Adaptive Control  
ii. Self tuning regulator model reference control
6. (a) Explain different modes of operation of static scberibus drive in detail. [7M]  
(b) Explain the indirect methods of vector control of induction motor. [7M]

#### UNIT – IV

7. (a) Explain in detail about operation of synchronous motor with neat diagram and also explain its characteristics. [7M]  
(b) Explain the designing and operation of maximum permissible torque speed control scheme with its implementation strategy. [7M]
8. (a) Describe separate controlled mode and self-controlled mode of operation of a synchronous motor drive in detail and compare them. [7M]  
(b) A 6MW, 3-ph, 11KV, Y connected, 6 pole, 50Hz, 0.9(lead) pf synchronous motor has  $X_s=9\text{ohm}$ ,  $R_s=0$ , rated field current is 50A. Machine is controlled by variable frequency control at constant V/F ratio upto the base speed and at constant V above base speed determine the Torque and field current for the rated armature current, 750rpm and 0.8 leading pf. [7M]

#### UNIT – V

9. (a) Discuss the operation of current controlled BLDC motor drive. [7M]  
(b) Explain in detail torque production and operation of variable reluctance motor drive. [7M]
10. (a) Describe the operation of current control in variable reluctance motor drive. [7M]  
(b) Explain the operation and characteristics of current controlled brushless DC servo drives. [7M]

Hall Ticket No

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Question Paper Code: BPE210



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**POWER QUALITY**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**  
**All Questions Carry Equal Marks**  
**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain various power quality issues from the consumer point of view. [7M]  
(b) Do you agree with the statement “ Power quality is the same as voltage quality” Give arguments to justify your answer. [7M]
2. (a) Why should power engineer concern him self about power quality. [7M]  
(b) Discuss the procedure for evaluating power quality. [7M]

**UNIT – II**

3. (a) Discuss contribution of single phase and three phase static and rotating AC to DC converters to harmonic distortion. [7M]  
(b) What is total harmonic distortion? Discuss how power electronic drives contribute to its increase. [7M]
4. (a) Discuss in detail about nonlinear loads and how they cause waveform distortion. [7M]  
(b) Discuss in detail about the power quality issues arising out of the operation of arc furnaces. [7M]

**UNIT – III**

5. (a) Explain how high values of AC and DC voltages are measured. [7M]  
(b) How is the power factor measured in a power system. How does low power factor impact power quality. [7M]
6. (a) Discuss relative merits and demerits of using Fourier Transforms and Wavelet Transforms in analyzing power quality. [7M]  
(b) What is meant by characterization of power quality disturbance and how DFT is used to achieve it. [7M]



#### UNIT – IV

7. (a) Discuss various ways of analyzing unbalance. [7M]  
(b) Distinguish between symmetrical components of phasor quantities and instantaneous symmetrical components. [7M]
8. (a) Compare various analysis techniques like Discrete Fourier Transform, Short Time Fourier Transform and Discrete Wavelet Transform in characterizing power quality disturbances. [7M]  
(b) Describe how an impulsive transient disturbance is characterized in time domain. [7M]

#### UNIT – V

9. (a) Discuss how passive harmonic filters are used to mitigate harmonics? [7M]  
(b) Discuss the importance of custom power devices in mitigating power quality issues. [7M]
10. (a) Explain control strategies applicable to UPQC. [7M]  
(b) Describe how sensitive loads are protected using DVR. [7M]

Hall Ticket No

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Question Paper Code: BPE210



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**POWER QUALITY**  
(Power Electronics and Electric Drives)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Discuss classification of power quality issues. [7M]  
(b) Distinguish between voltage sags and swells, outage and power interruption, voltage unbalance and waveform distortion, voltage fluctuation and flicker. [7M]
2. (a) Distinguish between harmonics, interharmonics, notching and power frequency variations. [7M]  
(b) Explain what is meant by characterization of power quality disturbance. [7M]

**UNIT – II**

3. (a) Discuss contribution of three phase static AC to DC rotating converters to harmonic distortion. [7M]  
(b) What is total harmonic distortion (THD) Discuss how various nonlinear loads contribute to increase of THD. [7M]
4. (a) Discuss in detail about power electronic loads and how they cause waveform distortion. [7M]  
(b) Discuss in detail about the power quality issues arising out of the operation of Fluorescent lamps and arc discharge lamps. [7M]

**UNIT – III**

5. (a) Explain how high values of AC and DC voltages and currents are measured for the purpose of power quality evaluation. [7M]  
(b) How is the power factor of a load is measured. How can power factor of a load be improved? [7M]
6. (a) Discuss relative merits and demerits of using Wavelet Transforms and Walsh Transforms in analyzing power quality. [7M]  
(b) What is meant by characterization of power quality disturbance and how frequency domain methods are used to arrive at it. [7M]

#### UNIT – IV

7. (a) Discuss what is meant by voltage sag and swell. [7M]  
(b) What is the application of Detroit Edison sag score? [7M]
8. (a) What is meant by voltage sag energy. [7M]  
(b) Discuss how the concept of voltage sag lost energy index (VSSEI) is applied. [7M]

#### UNIT – V

9. (a) Discuss how capacitor banks and tuned filters are used to mitigate harmonics? [7M]  
(b) Discuss various devices used for mitigating power quality issues. [7M]
10. (a) Explain control strategies applicable to DVR. [7M]  
(b) Describe how load compensation is achieved using DSTATCOM. [7M]

Hall Ticket No

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Question Paper Code: BCC005



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**COMPUTER AIDED MANUFACTURING**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain the four types of APT statements with examples. [7M]  
(b) Explain the design and implementation of post processors. [7M]
2. (a) Explain the computer assisted part programming in detail and also explain the working of post processor. [7M]  
(b) Explain the code of part programming in detail. [7M]

**UNIT – II**

3. (a) Differentiate between DNC and CNC machines. [7M]  
(b) Explain the principle of operation of CNC machine tools. [7M]
4. (a) Differentiate the closed and open loop system. [7M]  
(b) Discuss the adaptive control of machining process for turning. [7M]

**UNIT – III**

5. (a) Explain the general structure and the functions of a post processor. [7M]  
(b) Write about the creation of DAPP based post processor. [7M]
6. (a) Explain about the communication channels and major variables in DAPP based post processor. [7M]  
(b) Explain the functions of a post processor in detail. [7M]

**UNIT – IV**

7. (a) Discuss in detail about the application of micro controllers and its structure. [7M]  
(b) Explain any two applications of PLCs in CNC machines. [7M]

8. (a) Discuss in detail the application of PLCs in CNC machines with examples. [7M]  
(b) Explain the application and programming of micro controllers. [7M]

**UNIT – V**

9. (a) Explain about the artificial neural networks. [7M]  
(b) Explain any two of the optical inspection methods in detail. [7M]
10. (a) Explain in detail about the computer aided testing. [7M]  
(b) Write the advantages of computers in inspection and quality control. [7M]

Hall Ticket No

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Question Paper Code: BCC005



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**COMPUTER AIDED MANUFACTURING**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain the computer assisted part programming in detail and also explain the working of post processor. [7M]  
(b) Explain any five preparatory commands. [7M]
2. (a) Explain the design and implementation of post processors. [7M]  
(b) Explain the code of part programming in detail. [7M]

**UNIT – II**

3. (a) Discuss the adaptive control of machining process for grinding. [7M]  
(b) Write the advantages and disadvantages of DNC. [7M]
4. (a) Discuss about the adaptive control with constraints. [7M]  
(b) Explain the components of DNC in detail. [7M]

**UNIT – III**

5. (a) Explain the general structure and the functions of a post processor. [7M]  
(b) Write about the DAPP based post processor. [7M]
6. (a) Explain about the communication channels and major variables in DAPP based post processor. [7M]  
(b) Explain the functions of a post processor in detail. [7M]

**UNIT – IV**

7. (a) Explain about the internal relays and counters in detail. [7M]  
(b) Explain any two applications of PLCs in CNC machines. [7M]

8. (a) Discuss in detail the basic structure and principle of operations of PLC. [7M]  
(b) Explain the selection of micro controllers. [7M]

**UNIT – V**

9. (a) Explain about the CMM in detail. [7M]  
(b) Discuss the Importance of artificial intelligence in CAD. [7M]
10. (a) Explain about the expert systems and its structures. [7M]  
(b) Write the advantages of computers in inspection and quality control. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**COMPUTER AIDED PROCESS PLANNING**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain the working of generative CAPP system. Mention the advantages and limitation of it. [7M]
- (b) Explain the working of generative CAPP system with a neat sketch. [7M]
2. (a) Explain about knowledge based system. Mention its merits and demerits [7M]
- (b) Discuss the structure of automated process planning system and compare it with conventional process planning. [7M]

**UNIT – II**

3. (a) Briefly describe various quantitative methods for optimal selection of a manufacturing sequence. [7M]
- (b) Explain group technology with structure and implementation procedure. [7M]
4. (a) “How reduction of total set up cost for particular sequence effects manufacturing sequence”. Explain with a case study. [7M]
- (b) Explain selection of manufacturing sequence in making an automobile vehicle. With a neat sketch. [7M]

**UNIT – III**

5. (a) What are the various factors to be considered for optimal selection of machining parameters. [7M]
- (b) Describe how the production i-rate, cost, surface quality effect on machining parameters. [7M]
6. (a) Mention the various methods for determine the machining parameters. Briefly explain the advantages of mathematical approach over conventional approach. [7M]
- (b) Explain reasons for optimal selection of machining parameters with a case study. [7M]

**UNIT – IV**



7. (a) Explain tolerance in detail. Distinguish between design tolerance and manufacturing tolerance. [7M]
- (b) Explain the advantages of integrated approach over sequential approach. [7M]
8. (a) For the given CNC turning part determine the design tolerance, manufacturing tolerance. [7M]

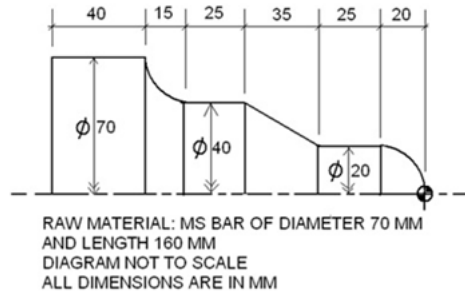


Figure 1

- (b) Explain the determination of manufacturing tolerance with an example. [7M]

### UNIT – V

9. (a) Determine the optimal index position for executing fixed sequence in NC tool path generation. [7M]
- (b) Explain criteria for selection of a CAPP in computer integrated planning system. [7M]
10. (a) Write a part programming for turning using NC code [7M]

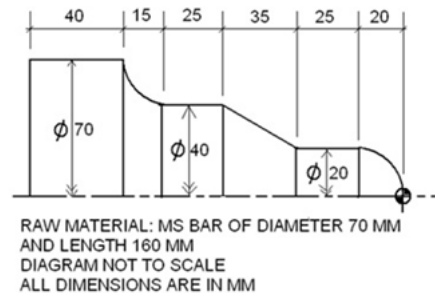


Figure 2

- (b) Write a part programming for Milling “WELCOME”, height of each letter is 70mm and width of the letter is 35mm. [7M]

Hall Ticket No

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Question Paper Code: BCC208



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**COMPUTER AIDED PROCESS PLANNING**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Briefly explain various methods for optimal selection of manufacturing sequence. [7M]  
(b) Discuss the structure of automated process planning system and compare it with conventional process planning. [7M]
2. (a) Compare manual experience based process planning and CAPP in detail with an example, summarize the merits. [7M]  
(b) Explain the working of generative CAPP system with a neat sketch. [7M]

**UNIT – II**

3. (a) Explain group technology with relative advantages and applications. [7M]  
(b) Explain quantitative methods for optimal selection quote examples for each. [7M]
4. (a) Explain how group technology can implemented in manufacturing in CAPP. [7M]  
(b) How selection of manufacturing sequence is performed what are its significance and merits. [7M]

**UNIT – III**

5. (a) Explain reasons for optimal selection of machining parameters with a case study. [7M]  
(b) Explain solving of optimization models of machining process. [7M]
6. (a) Explain how machining parameter effect on production i-rate, cost and surface quality. [7M]  
(b) Explain how machining parameter effect on production i-rate, cost and surface quality. [7M]

## UNIT – IV

7. (a) For the given CNC turning part determine the design tolerance, manufacturing tolerance [7M]

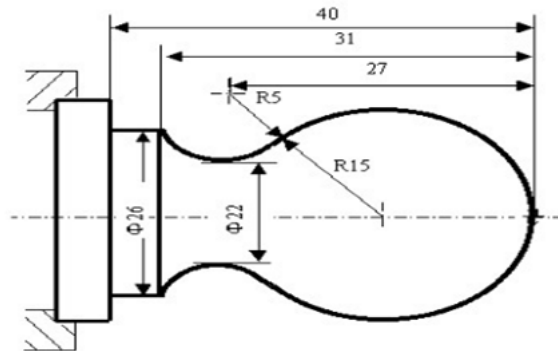


Figure 1

- (b) Explain the integration of design and manufacturing tolerances and mention the advantages of integrated approach over sequential approach. [7M]
8. (a) Explain tolerance in detail. Distinguish between design tolerance and manufacturing tolerance. [7M]
- (b) Explain the determination of manufacturing tolerance with an example. [7M]

## UNIT – V

9. (a) Explain criteria for selection of a CAPP in computer integrated planning system. [7M]
- (b) Determine the optimal index position for executing fixed sequence in NC tool path generation. [7M]
10. (a) Write short notes on computer integrated planning system. [7M]
- (b) Explain criteria for selection of a CAPP in MIPLAN system. [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DESIGN OF HYDRAULICS AND PNEUMATIC SYSTEMS**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain the types of hydraulic fluids, and selection criteria for a hydraulic system. [7M]  
(b) List all the properties that a good hydraulic fluid possesses. [7M]
2. (a) An oil having a density of  $0.89\text{g/cm}^3$  is tested using a kinematic viscosimeter. The given amount of oil flowed through the capillary tube in 250s. The calibration constant is 0.100. Find the kinematic and absolute viscosities in poise and centipoises. [7M]  
(b) Compare the use fluid power to a mechanical system by listing the advantages and disadvantages of each. [7M]

**UNIT – II**

3. (a) Classify hydraulic pumps. Describe the working of rotary pumps. What are merits of rotary pumps. [7M]  
(b) Why is cushioning needed in a hydraulic cylinder. Explain with a neat sketch the principle operation of a fixed cushioned cylinder. [7M]
4. (a) What is the different between a variable displacement pump and fixed displacement pump. When do user prefer a variable displacement and fixed displacement pump. [7M]  
(b) Explain the working of a vane pump. Derive an expression for theoretical discharge. [7M]

**UNIT – III**

5. (a) Design and sketch the hydraulic power pack of 15 liter capacity with a gear pump and induction motor and other required elements. [7M]  
(b) Discuss the details of the following factors in selection of hydraulic pump. [7M]
6. (a) Describe pressure relief valve with a neat sketch, and design a hydraulic circuit with a pressure relief valve. [7M]  
(b) Design a hydraulic gear pump with 2.5 module and establish the discharge rate and pressure range. [7M]

#### UNIT – IV

7. (a) Describe the meter-in and meter-out in hydraulic system with a neat sketch. [7M]  
(b) Explain accumulator. State the applications of accumulator. Explain the use of accumulator as leakage compensator with a hydraulic circuit. [7M]
8. (a) Design a hydraulic circuit with directional control valve, solenoid valve with a neat sketches. [7M]  
(b) Design a hydraulic circuit with check valves. Explain the use of check valves. Merits, demerits and applications. [7M]

#### UNIT – V

9. (a) Explain with a block diagram the functions of PLC. [7M]  
(b) Explain PLC based circuit for extension and retraction of a cylinder and explain with a neat sketch. [7M]
10. (a) Explain LSA with a case study, merits demerits and applications. [7M]  
(b) Describe the maintenance schedules and troubleshooting procedures for pneumatic circuits. [7M]

Hall Ticket No

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Question Paper Code: BCC004



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DESIGN OF HYDRAULICS AND PNEUMATIC SYSTEMS**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Describe the environmental issues dealing with developing biodegradable fluids, reduce oil leakage and reducing noise levels. [7M]
- (b) Discuss the general criteria to be considered for selection of hydraulic fluid. [7M]
2. (a) Compare the use fluid power to a mechanical system by listing the advantages and disadvantages of each. [7M]
- (b) Differentiate between hydraulics and pneumatics. [7M]

**UNIT – II**

3. (a) Why cushioning needed in a hydraulic cylinder. Explain with a neat sketch, the principle of operation of a fixed cushioned cylinder. [7M]
- (b) Classify the hydraulic pumps. Describe the working of rotary pumps Piston pumps. What are merits of it. [7M]
4. (a) Explain detail about selection, specifications and characteristics of linear rotary actuator. [7M]
- (b) A cylinder has a bore of 125mm diameter and a rod of 70mm diameter. It drives a load of 2000kg vertically up and down at a maximum velocity of 3m/s. The load is slowed down to rest in the cushioning length of 50mm. If the relief valve is set at 140 bar, determine the average pressure in the cushions while extending and retracting. [7M]

**UNIT – III**

5. (a) Design and sketch pressure relief valve for 10 to 20 bar pressure valve. [7M]
- (b) Discuss the details of the following factors in selection of hydraulic pump. [7M]
6. (a) Design and sketch the hydraulic power pack of 20 liter capacity with a gear pump and induction motor and other required elements. [7M]
- (b) How the hydraulic motors are rated and derive an equation for torque of the motor. [7M]

#### UNIT – IV

7. (a) Design a bleed-off circuit in pneumatic systems, write down the applications of bleed-off circuit. [7M]
- (b) Design a hydraulic circuit with check valves. Explain the use of check valves, merits, demerits and applications. [7M]
8. (a) Design a hydraulic circuit with check valves. Explain the use of check valves, merits, demerits and applications. [7M]
- (b) What is an accumulator. State the application of accumulator. Enumerate the different configurations of linear actuators. [7M]

#### UNIT – V

9. (a) Explain PLC and logical gates in PLC with examples. [7M]
- (b) Differentiate between LCA and microcontroller. [7M]
10. (a) Explain functioning of relay circuit. How it is used in automation. [7M]
- (b) Explain use of microcontroller for sequencing, Explain how microcontroller is used in automation, with a neat sketch, applications. [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### DESIGN FOR MANUFACTURING ASSEMBLY (CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

- Enumerate design rules and guidelines applicable to dimensional tolerances of various machining processes. What is design for machining. [7M]
  - Explain steps involved in design process. [7M]
- Explain the design philosophy, steps involved in design process. [7M]
  - Explain the criteria for material selection with a case study. [7M]

#### UNIT – II

- Explain the design and guidelines for machining processes. [7M]
  - Explain the important guidelines for casting process, List out and explain the effect of casting defects. [7M]
- Enumerate design rules and guidelines applicable to casting tolerances. [7M]
  - Explain with a suitable example the steps in improving the design of a component from the point of view of machining. [7M]

#### UNIT – III

- Explain the design principles for deep drawing. Explain the keeler Goodman Forming line diagram. [7M]
  - Explain design of closed forging design and drop forging die design with a neat sketch. [7M]
- Discuss the general design guidelines of welding, explain post and pre treatment of welding, effects of thermal stresses in welding. [7M]
  - Discuss the effects of thermal stresses in welding. Explain their effect on pre-welding and post welding. [7M]

#### UNIT – IV

- Explain design guidelines for automatic assembly. [7M]
  - Explain the social effects of automation. [7M]
- Explain indexing mechanisms in detail with sketches. [7M]
  - Explain the automatic assembly transfer systems. [7M]



## UNIT – V

9. (a) Describe the approaches based on design principles and rules for design for assembly methods. [7M]  
(b) Explain design guidelines for part assembly. [7M]
10. (a) Explain the effects of chamfer design and insertion operation. [7M]  
(b) Explain the general design guidelines for manual assembly. [7M]

Hall Ticket No

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Question Paper Code: BCC202



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**DESIGN FOR MANUFACTURING ASSEMBLY**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

**UNIT – I**

1. (a) “The factor of material selection will influence both design and manufacture” Justify the statement by considering each factor what is the need for new materials in high technology domains. [7M]  
(b) Explain the design rules of manufacturability. [7M]
2. (a) Explain about phases of design briefly. [7M]  
(b) Explain briefly process selection charts. [7M]

**UNIT – II**

3. (a) Compare product design rules for sand casting with general design rules. [7M]  
(b) What is general design for consideration for casting processes. [7M]
4. (a) Discuss the factors to be considered to facilitate defect free casting in investment casting method. [7M]  
(b) Explain the importance of solidification simulation in casting design. [7M]

**UNIT – III**

5. (a) Discuss the various factors that are to be considered in the design of weldments. Discuss the effects of thermal stresses in welding. [7M]  
(b) Explain the design guidelines for extruded sections. [7M]
6. (a) Explain the pre and post treatment of welds. [7M]  
(b) Explain the design principles for bending. With neat sketch. [7M]

**UNIT – IV**

7. (a) Explain the automatic assembly transfer systems. [7M]  
(b) Explain the development of assembly process, types of assembly methods, merits and demerits of assembly [7M]
8. (a) Explain the social effects of automation, Explain with a case study. [7M]  
(b) Explain transfer mechanisms, briefly explain about continuous and intermittent transfer systems. [7M]

## UNIT – V

9. (a) Explain the development of the systematic DFA methodology. [7M]  
(b) Explain design guidelines for part assembly. [7M]
10. (a) Explain the effects of chamfer design and insertion operation. [7M]  
(b) Explain in detail design of fits in design process, general design guidelines in manual assembly. [7M]

Hall Ticket No

Question Paper Code: BCC006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FLEXIBLE MANUFACTURING SYSTEMS**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) Explain Innovations that have advanced the manufacturing industries. [7M]  
(b) What are the principle objectives of FMS. [7M]
2. (a) Explain the area of applications of FMS in an industry. [7M]  
(b) Explain types of FMS layouts. [7M]

**UNIT – II**

3. (a) Explain forward scheduling approaches with infinite capacity loading. [7M]  
(b) Explain system modeling issues. [7M]
4. (a) Write the principle of system modeling. [7M]  
(b) Write about centralized versus distributed. [7M]

**UNIT – III**

5. (a) Write about issues related to stochastic models. [7M]  
(b) Explain about basic concepts of markov chains. [7M]
6. (a) Briefly explain about monte carlo method. [7M]  
(b) Write about the continuous and discrete mathematical modeling methods. [7M]

**UNIT – IV**

7. (a) Explain the manufacturing system analysis. [7M]  
(b) Discuss about that information too complex to be useful and effective? [7M]
8. (a) Explain about the tools, equipment or resources capabilities. [7M]  
(b) Explain the application performance analysis. [7M]

**UNIT – V**

9. (a) What does an unscheduled stop cost you? What is so problematic with “Break Down Maintenance”? [7M]
- (b) Why should your dealership perform the Preventive Maintenance on your vehicle? [7M]
10. (a) What benefits can you realize with a dealer Preventive Maintenance Program? [7M]
- (b) Why does that make it eligible for federal aid funding. [7M]

Hall Ticket No

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Question Paper Code: BCC006



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**FLEXIBLE MANUFACTURING SYSTEMS**  
(CAD/CAM)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) What are various advantages and disadvantages of FMS implementation? [7M]  
(b) Explain concepts of FMS? [7M]
2. (a) Explain the AIMS of FMS. [7M]  
(b) Explains the Innovations that have advanced the manufacturing industries? [7M]

**UNIT – II**

3. (a) Differentiate between real time vs discrete event control. [7M]  
(b) Differentiate the forward vs backward scheduling approaches. [7M]
4. (a) Explain system modelling issues. [7M]  
(b) Differentiate between conflicts, concurrency and synchronization. [7M]

**UNIT – III**

5. (a) Write about issues related to deterministic. [7M]  
(b) Write about issues related to stochastic models. [7M]
6. (a) Explain about basic concepts of markov chains. [7M]  
(b) Briefly explain about monte carlo method. [7M]

**UNIT – IV**

7. (a) Explain the application performance analysis. [7M]  
(b) Explain the transient analysis of manufacturing. [7M]
8. (a) Explain the manufacturing system analysis. [7M]  
(b) Discuss about that information too complex to be useful and effective? [7M]

**UNIT – V**

9. (a) What does an unscheduled stop cost you? What is so problematic with “Break Down Maintenance”? [7M]
- (b) Why should your dealership perform the Preventive Maintenance on your vehicle? [7M]
10. (a) What benefits can you realize with a dealer Preventive Maintenance Program? [7M]
- (b) Are all maintenance items now eligible for FA? [7M]

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**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – I**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**ADVANCED STEEL DESIGN**  
(Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

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**UNIT – I**

1. (a) A member of a truss consists of two angles ISA 80mm x80mm x 6 mm placed back to back. It carries an ultimate tensile load of 175kN and is connected to a gusset plate 8mm thick placed in between the two connected legs. Determine the number of 16mm diameter 4.6 grade ordinary bolts required for the joint. Assume  $f_u$  of plate as 410MPa. [7M]
- (b) Distinguish between [7M]
  - i. Factor of safety and partial factor for loads
  - ii. Characteristics loads and design loads
2. (a) A bridge truss carries an axial pull of 500 KN. It is to be a gusset plate 25mm thick by a double cover butt joint with 20mm diameter power driven rivets. Design an economical joint. Determine the efficiency of the joint. [7M]
- (b) Two plates 10 mm and 25 mm thick are connected by double cover butt joint made of 8mm cover plate. Find the strength of the joint. If 8 numbers of M20 bolts of grade 4.6 and Fe 415 are used on either sides of the joint in two rows with pitch of 50mm and edge distance of 40mm in both direction. [7M]

**UNIT – II**

3. (a) What are the different types of beam column connections? [7M]
- (b) Design a column to support a factored load of 1200 kN. The column has an effective length of 8m with respect to z- axis and 4m with respect to y- axis. Use steel grade Fe410. [7M]
4. (a) Suggest & design beam-column welded connection for ISMB500 & ISSC200 to carry 120 KNm. B.M. & 100KN shear. [7M]
- (b) A beam ISMB 400 @ 61.6 kg/m transmits an end shear of 150kN to the flange of a stanchion ISHB 300 @ 58.8 kg/m. Design an un-stiffened welded seat connection using shop welds. [7M]



### UNIT – III

5. (a) Calculate dead load and live load per panel point of a Howe roof truss using following data: [7M]
- i. Span of truss = 15m
  - ii. Spacing of truss = 5 m
  - iii. Rise of truss = 2.5 m
  - iv. No. of panels = 8
  - v. Roof covering : A.C sheets
- (b) Mention the design steps for channel or I section purlins. [7M]
6. (a) Enlist the loads acting on the structure and write on live load Calculation for roof truss. [7M]
- (b) An industrial building is made of 10 portal frames spaced 5m apart. The frame has a span of 30m and 4m rise with a column height of 6m above ground level. Assuming the column bases are hinged, design the frame for dead, live and wind loads as per IS 875. [7M]

### UNIT – IV

7. (a) Discuss wind loads and wind effects on truss girder bridges. [7M]
- (b) Analyze the portal bracing of a truss girder bridge when it is subjected to a lateral force of 50kN. [7M]

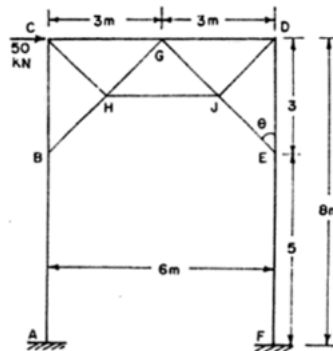


Figure 1

8. (a) How is the tension members designed for a truss girder bridge? [7M]
- (b) Design completely a through type truss girder bridge to carry a single track BG loading for the following data: [7M]
- i. Effective span = 55m
  - ii. c/c spacing of stringer = 2.5m
  - iii. sleepers and their spacing = 250x130x2.5mm @ 0.5m c/c
  - iv. density of timber =  $7.4 \text{ kN/mm}^3$
  - v. weight of stock rails = 0.44kN/m
  - vi. weight of guard rail = 0.26kN/m
  - vii. Weight of fastenings etc = 0.28kN/m of track.

## UNIT – V

9. (a) Explain the types of flow through hopper with descriptive figures. [7M]  
(b) Discuss Jannsen's theory for design of bins. [7M]
10. (a) Vividly explain the different failure modes of steel silos. [7M]  
(b) i. Distinguish between bunker and silo with the help of diagram. [7M]  
ii. Explain factors affecting design of bins.

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### ADVANCED STEEL DESIGN (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. (a) Determine the design tensile strength of the plate (200 X 10 mm) with the holes as shown below, if the yield strength and the ultimate strength of the steel used are 250 MPa and 420 MPa and 20 mm diameter bolts are used.  $f_y = 250$  MPa  $f_u = 420$  MPa. [7M]

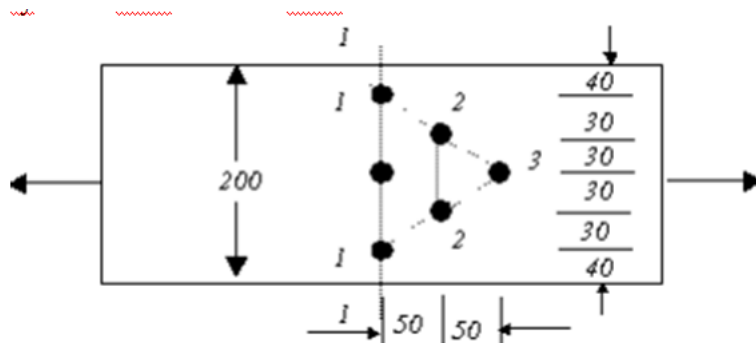


Figure 1

- (b) Write short notes on (any two) : [7M]
- i. Sway Bracings.
  - ii. Rocker Bearings.
  - iii. Disadvantages of Riveted Connections
2. (a) Write about different types of failure of bolted joints with the help of figures. [7M]
- (b) A single bolted double cover butt joint is used to connect two plates 6mm thick. Assuming the bolts of 20mm diameter at 60mm pitch calculate the efficiency of the joint. Use 410MPa plates and 4.6 grade bolts. [7M]

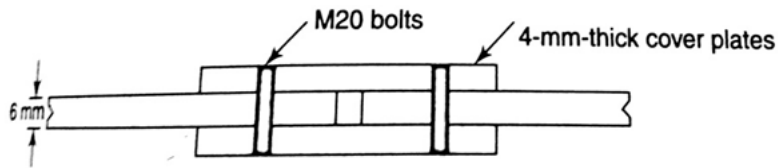


Figure 2

## UNIT – II

3. (a) Design a beam to span 5m carrying a load of 5kN/m inclusive of self-weight. The ends of the beam are unstrained against lateral bending. Take  $f_y = 235\text{N/mm}^2$ . [7M]
- (b) What are the different types of beam column connections? [7M]
4. (a) Two secondary beams ISMB 400 @61.6 kg/m transmits a reaction of 225kN to either side of a girder ISMB 600@ 122.6kg/m. Design double fillet shop welded web connection. [7M]
- (b) A beam ISMB 400 @ 61.6 kg/m transmits an end shear of 150kN to the flange of a stanchion ISHB 300 @ 58.8 kg/m. Design an un-stiffened welded seat connection using shop welds. [7M]

## UNIT – III

5. (a) A shed is proposed to be constructed at Chennai. The slope of the roof truss is corresponding to a pitch of 1/4 The average height of the roof above the ground is 15m. The life of the structure is expected to be about 50 years. The terrain has less obstruction. The cladding length is in between 30m to 40 m. the permeability of the truss is assumed to be medium. Calculate the various loads on the truss. The roof covering is GI sheeting. [7M]

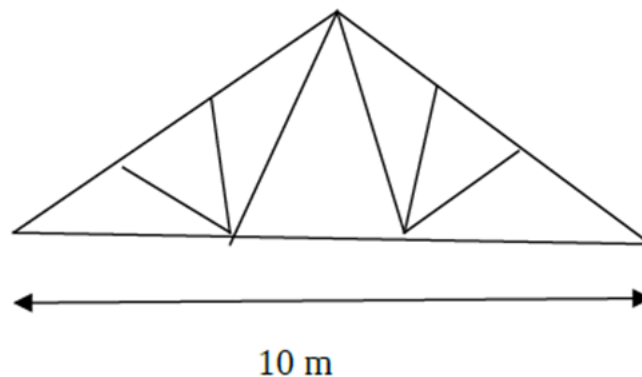


Figure 3

- (b) Describe the components of a roof truss with neat diagrams. [7M]
6. (a) Write on the dead loads, snow loads, wind loads and imposed loads considerations for design of roof trusses. [7M]
- (b) Design a purlin for a roof truss having the following data: [7M]
  - Span of the truss = 6.0m ,Spacing of truss = 3m c/c,
  - Inclination of roof =  $30^\circ$
  - Spacing of Purlin = 2m c/c
  - Wind pressure =  $1.5\text{ kN/m}^2$ ,Roof coverage= A.C
  - Sheeting weighing  $200\text{ N/m}^2$  , Provide a channel section Purlin.

#### UNIT – IV

7. (a) A deck type 'N' truss bridge has 10 equal panels of 4m each with depth of truss 4m. The dead load & live load intensities are 30 kN/m & 40 kN/m respectively. Draw influence line diagram for members at top panel point from left end of truss. Using impact factor 0.40 design top chord section [7M]
- (b) Describe the joints in compression members of railway bridges. [7M]
8. (a) A Pratt truss girder through bridge for single broad gauge track has an effective span of 30m. The truss girder has 6 panels of 5m each. The cross girders are spaced 5m apart while the stringers are spaced 2m between centre lines. The sleepers are spaced 30cm from centre to centre and has a size of 28mx250mmx200mm, made of timber weighing 7.5kN/mm<sup>2</sup>. The weight of stock rails and check rails may be taken as 0.6 and 0.4 kN per metre. The c/c/ spacing of main girders is 7m. Design for the central panel, the top chord member, bottom chord member and verticals and diagonals. Also design the joint. Take height of the girder between C.G. of chord as 6.5m. [7M]
- (b) Determine the decrease or increase of forces in central chord members of the leeward truss-girder in the following case: [7M]
- Overturning effect due to wind, when the bridge is loaded.
  - Lateral effects of top and bottom chord bracings when the bridge is loaded

#### UNIT – V

9. (a) What are the problems concerned with the design of storage hoppers? [7M]
- (b) Explain about design of Silos by using AIRY's method. [7M]
10. (a) Give a detailed description of the different designs of hoppers. [7M]
- (b) Write the step wise procedure followed in the design of Bins [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) During an earthquake the maximum amplitude recorded at a site by Wood- Anderson Seismograph is 20 cm. The maximum ground velocity recorded was 25 cm/sec. The site was found to be 75 km away from the epicenter. Determine the Magnitude and Intensity of the occurred earthquake. [7M]
- (b) Explain the steps of seismic hazard analysis? [7M]
2. (a) Define hash function. Explain an example situation where hash functions are successfully used in cyber forensics. [7M]
- (b) Derive an expression for damped frequency in case of single degree damped free vibration system. [7M]
- (c) Derive the equation of motion of the weight  $w$  suspended from a spring at the free end of a cantilever steel beam shown in Figure 1. For  $E = 29000$  Ksi. Neglect the mass of the beam and spring. [7M]

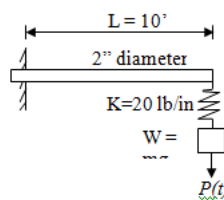


Figure 1

#### UNIT – II

3. (a) Briefly introduce the philosophy and principles of earthquake resistant design of buildings. [7M]
- (b) Discuss the contribution of irregularity in strength and stiffness to structural damage in structures during strong earthquakes. [7M]
4. (a) Identify and discuss the plan configuration problems to structural damage in structures during strong earthquakes. [7M]
- (b) What are the main design criteria for buildings? [7M]

### UNIT – III

5. (a) Give the details of lateral force resisting systems approved by the code IS 1893(Part1):2002. [7M]  
(b) A RCC beam of rectangular section has to carry a distributed live load of 20kN/m in addition to its own weight and a dead load of 25kN/m. The maximum bending moment and shear force due to the earthquake are 60kN-m and 40 kN respectively. Centre to Centre distance between supports is 6 m. Design the beam using M-20 grade concrete and Fe 415 steel. [7M]
6. (a) Explain response spectrum method? [7M]  
(b) Explain time history analysis? [7M]

### UNIT – IV

7. Analyse the earthquake resistant design of multi storey building . [14M]
8. Design rectangular beam for 8m span to support a DL of 10 KN/m and a LL of 12 kN/m inclusive of its own weight. Moment due to earthquake load is 100kN-m and shear force is 80kN. Use M20 grade concrete and Fe415 steel. [14M]

### UNIT – V

9. Explain the main Code-based procedures for seismic analysis? [3M]
10. Identify the damages and non damages in masonry structures. [14M]

Hall Ticket No 

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Question Paper Code: BST210



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
(Autonomous)

**MODEL QUESTION PAPER – II**

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

**EARTHQUAKE RESISTANT DESIGN OF BUILDINGS**  
(Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

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**Answer ONE Question from each Unit**  
**All Questions Carry Equal Marks**  
**All parts of the question must be answered in one place only**

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**UNIT – I**

1. Explain how measurement of ground motion is done by seismologists and design engineers. [14M]
2. (a) Write a short note on seismic zoning. [7M]  
(b) Explain dynamics of SDOF. [7M]

**UNIT – II**

3. Explain vertical and horizontal irregularities in multistoried buildings and their effect on seismic behavior, of such buildings. [14M]
4. (a) Explain in detail identification of seismic damages in RCC buildings [7M]  
(b) Write down the basic elements of earthquake resistant design. [7M]

**UNIT – III**

5. Explain the seismic coefficient method of analysis in detail. [14M]
6. (a) State the response spectrum method with an example. [7M]  
(b) Develop seismic analysis procedure as per IS1893 code. [7M]

**UNIT – IV**

7. (a) What are the principles of earthquake resistant design of RCC buildings? [7M]  
(b) Define 'Shear Walls'. How are these classified? [7M]
8. The plan of a three-storeyed R.C.C school building is shown below. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building as a moment-resisting frame. The intensity of the dead load is  $10 \text{ KN}/m^2$  and the floors are to cater to an imposed load of  $3 \text{ KN}/m^2$ . Determine the design seismic loads on the structure by static analysis. Storey height of each floor is 3.5 m. [14M]



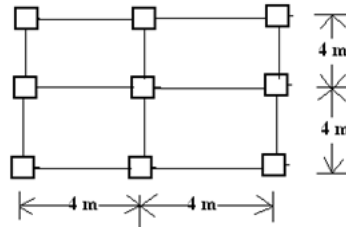


Figure 1

### UNIT – V

9. (a) Explain the design procedure 2 storey masonry building with example? [7M]
- (b) Sketch the details of RCC band to be provided at the plinth level of a two storied base masonry building. [7M]
10. (a) Discuss with sketches the effect of openings on the performance of masonry walls under laterals shaking due to earthquakes. [7M]
- (b) Compute the elastic properties of structural Masonary? [7M]



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### FINITE ELEMENT METHOD (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Find out deflection at centre of a simply supported beam of span length ( $L$ ) subjected to uniformly distributed load throughout its length of intensity  $w$  per unit length. Use Rayleigh Ritz method. Take  $EI$  is constant. [7M]
- (b) Determine the stiffness matrix, for the plane stress element as shown in figure 1. Take  $E = 200$  GPa, and  $\mu = 0.3$ , thickness of element = 10 mm. [7M]
2. (a) For the spring assemblage with arbitrarily numbered nodes shown in figure 1. Obtain [7M]
  - i. the global stiffness matrix
  - ii. the displacements of nodes 3 and 4
  - iii. the reaction forces at nodes 1 and 2
  - iv. the forces in each spring. A force of 5000 lb is applied at node 4 in the  $x$  direction. The spring constants are given in the figure. Nodes 1 and 2 are fixed.

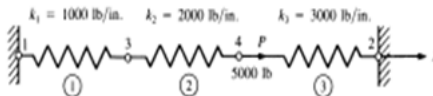


Figure 1

- (b) Derive an expression for damped frequency in case of single degree damped free vibration system. [7M]
- (c) A simply supported beam is subjected to uniformly distributed load over entire span. Determine the bending moment and deflection at the mid span using Rayleigh –Ritz method and compare with exact solution. Use a two term trial function  $y = a_1 \sin(\pi x/l) + a_2 \sin(3\pi x/l)$ . [7M]

#### UNIT – II

3. (a) The nodal coordinates of the triangular element are 1 (1,1), 2 (4,2), 3 (3,5). At the interior point P, the  $x$  coordinate is 3.5 and  $N_1$  is 0.4. Determine  $N_2$ ,  $N_3$  and  $y$  coordinate at point P. [7M]

- (b) A two noded line element with one translational degree of freedom is subjected to uniformly varying load of intensity  $P_1$  at node 1 and  $P_2$  at node 2. Evaluate the nodal load vector using numerical integration. [7M]
4. (a) For the stepped bar shown in the figure 2, determine the nodal displacements, element stress and support reactions. Take  $P = 500 \text{ kN}$ ,  $E = 210 \text{ GPa}$ ,  $a_1 = 200 \text{ mm}^2$ ,  $a_2 = 300 \text{ mm}^2$  and  $a_3 = 500 \text{ mm}^2$ . [7M]

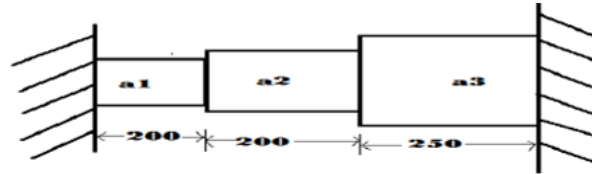


Figure 2

- (b) Derive the shape functions for element shown in figure 3 Shape functions should be specified in natural coordinate system. [7M]

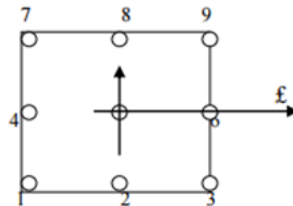


Figure 3

### UNIT – III

5. (a) Write short notes on [7M]
- Uniqueness of mapping of iso-parametric elements.
  - Jacobian matrix
  - Gaussian quadrature integration technique.
- (b) Determine the stiffness matrix for the axisymmetric element shown in figure 4 take  $E$  as  $2.1 \times 10^6 \text{ N/mm}^2$  and Poisson's ratio as 0.3. All dimensions are in mm. [7M]

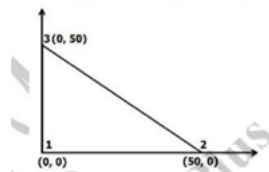


Figure 4

6. (a) Evaluate the Jacobian matrix at the local co-ordinates  $\zeta, \eta$  are  $(0, 0)$  for the element shown figure 5 [7M]

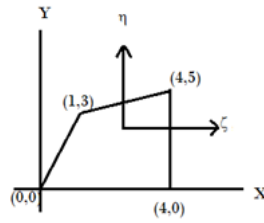


Figure 5

- (b) For the element shown in the figure 6 assemble Jacobian matrix and strain displacement matrix for the Gaussian point (0.57735, 0.57735). [7M]

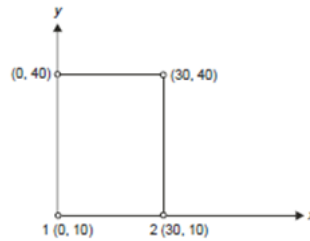


Figure 6

#### UNIT – IV

7. (a) Derive element stiffness matrix typical for plate bending with neat figure. [7M]  
 (b) Derive the elemental nodal load vector for four noded isoparametric quadrilateral plate element. [7M]
8. (a) Analysis the plate shown in fig. the two adjacent edges are fixed against rotation and translation, and the other two edges are free. Consider the following two load cases. [7M]  
 i. Uniform load of  $12 \text{ kn/m}^2$   
 ii. concentrated load of 10 KN at B. compare the result with analytical solution  $E= 2 \times 10^5 \text{ N/mm}^2$ ,  $\mu=0.3$ ,  $h=25 \text{ mm}$

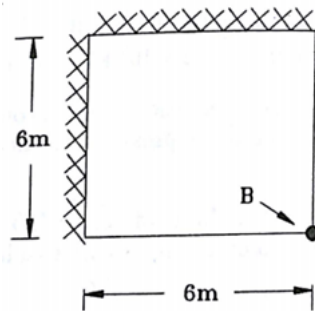


Figure 7

- (b) Derive an expression to compute the nodal load vector  $\{Q\}$  for a four noded element when it is subjected to varying pressure load. Indicate the numerical integration procedure that can be used for computation of  $\{Q\}$ . [7M]

## UNIT – V

9. (a) Describe Newton – Raphson iteration technique for solving material non-linearity problems. [7M]  
(b) Explain mid-point Rungekutta incremental procedure and discuss its advantage and disadvantage. [7M]
10. (a) Explain the solution methods for nonlinear algebraic equations. [7M]  
(b) Explain the iterative procedure of handling geometric non-linearity problems in structural mechanics. [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### FINITE ELEMENT METHOD (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. (a) Explain the terms 'Plane stress' and 'Plane strain' problems. Give constitutive laws for these cases. Specify stress and strain tensors for plane stress case. Give suitable examples for plane stress problems. [7M]
- (b) What is meant by 'discretization'? List and describe the general steps of the finite element method. [7M]
2. (a) Write the potential energy for beam of span 'L' simply supported at ends, subjected to a concentrated 'P' at midspan. Assume EI constant. [7M]
- (b) For a simply supported Beam of uniformly distributed load of Intensity  $P_0$  per unit length and a concentrated load P at center, Find the Transverse deflection using Raleigh-Ritz method of Functional Evaluation and compare the result with exact Analytical solution. [7M]

#### UNIT – II

3. (a) Determine nodal displacement, element stresses and support reactions of the axially loaded bar as shown in figure 1 [7M]

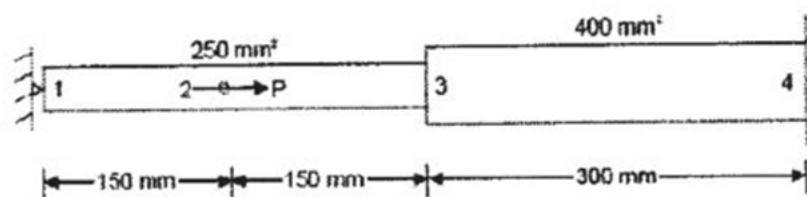


Figure 1

- (b) Derive shape functions and their derivatives for a line element with quadratic interpolation function. [7M]
4. (a) Evaluate the shape functions  $N_1$ ,  $N_2$  and  $N_3$  at the interior point P for the triangular element shown in the figure 2. [7M]

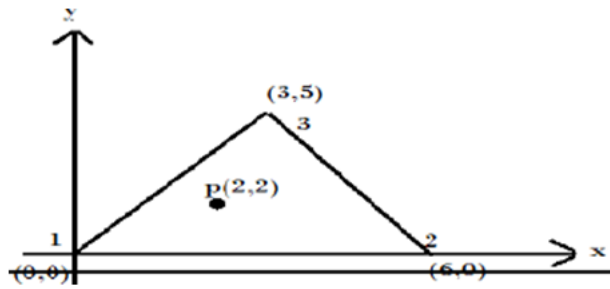


Figure 2

- (b) Explain what you understand by convergence requirements; and conditions to be satisfied by the assumed displacement function. What are compatibility requirements and geometric isotropy? [7M]

### UNIT – III

5. (a) Write a note on isoparametric formulations and how the geometric as well as field variables are taken into account? [7M]  
 (b) Using the Lagrange interpolation formula construct the shape function in natural coordinate for one dimensional axial element with 4 nodes. Sketch the shape function. [7M]
6. (a) For the iso parametric quadrilateral element shown in figure 3 , determine [7M]  
 i. a) Cartesian coordinate of the point P which has local coordinate  $\zeta = 0.57335$  and  $\eta = 0.57735$ .  
 ii. Jacobian matrix  
 iii. Gaussian quadrature integration technique.

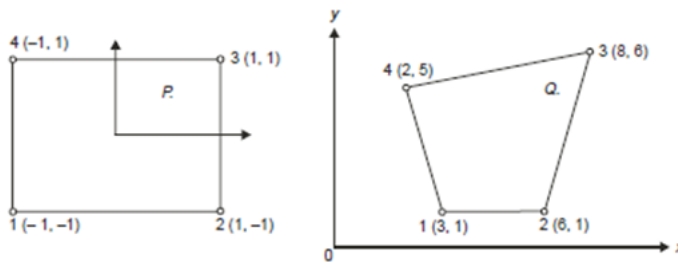


Figure 3

- (b) Explain finite element formulation for 8-noded isoperimetric solid element. Explain step by step procedure and elaborate all the steps. [7M]

### UNIT – IV

7. (a) What are the assumptions made in thin plates with small deflections? Give the relation between forces and stresses action on a thin plate. [7M]  
 (b) Figure 4 the simply supported skew plate and it is subjected to uniformly distributed load of  $4 \text{ KN/m}^2$ . Analyze the plate and compare the result with theoretical solution,  $h = 200 \text{ mm}$ ,  $E = 2 \times 10^4 \text{ N/mm}^2$ ,  $\mu = 0.3$ ,  $\alpha = 30^\circ$ . [7M]

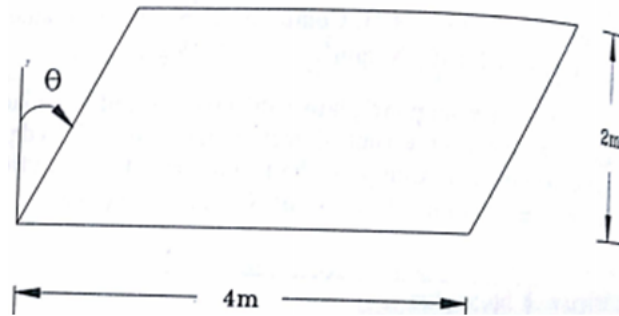


Figure 4

8. (a) Discuss Love-Kirchhoff's and Mindlin's plate bending theories in detail. [7M]  
 (b) Explain finite elements for plate analysis. Write notes on numerical integration and stress smoothing in the case of four noded quadrilateral plate element. [7M]

#### UNIT – V

9. (a) What are the types of non-linearity in structural analysis? Give two examples of geometric nonlinear problems? [7M]  
 (b) Discuss about Material and Geometric nonlinearity. Explain incremental procedure to handle material non-linear problems. [7M]
10. (a) Explain iterative procedure and modified iterative procedure for the analysis of material Non-linearity problems. [7M]  
 (b) How is geometry nonlinearity taken care in finite element analysis? Explain the solution methods for nonlinear algebraic equations. [7M]



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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### STRUCTURAL DYNAMICS (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. (a) Derive the solution for forced undamped single degree of freedom system. [7M]  
 (b) Calculate the equation of motion and solution of a undamped single degree of freedom system with free vibration. [7M]
2. (a) State Logarithmic decrement and explain it. [8M]  
 (b) Define [6M]
  - i. Dynamic magnification factor
  - ii. Oscillatory motion
  - iii. Degrees of freedom

#### UNIT – II

3. Analyse the differential equation of motion and determine the natural frequencies and mode shapes for the given system. [14M]

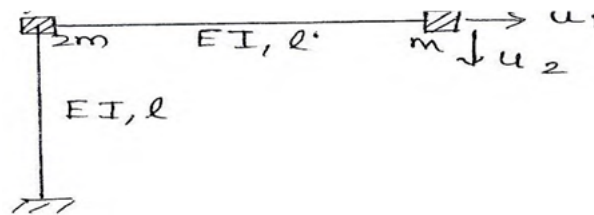


Figure 1

4. Derive the normal modes of vibration of double pendulum with same length and mass of pendulum. [14M]

#### UNIT – III

5. Analyze the Natural frequencies and mode shape for the given system and Check the orthogonality conditions. [14M]

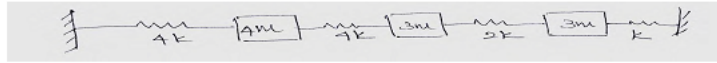


Figure 2

6. Create a model with four degree of freedom system and derive the equation of motion. [14M]

**UNIT – IV**

7. (a) Derive governing of differential equation of motion. [7M]  
 (b) Explain natural frequencies of simple beams with different ends. [7M]
8. For the multistory building shown in figure 3 Obtain frequencies and modes of vibration using Stodolla's method. Assume  $m = 5 \times 10^4$  kg,  $k = 5 \times 10^4$  kN/cm. [14M]

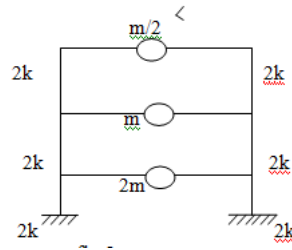


Figure 3

**UNIT – V**

9. Explain I.S. Code methods of analysis for obtaining response of multistoried buildings. [14M]
10. Explain lumped mass approach in SDOF Systems. [14M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

### STRUCTURAL DYNAMICS (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

#### UNIT – I

1. (a) Derive the solution for damped single degree of freedom system. [7M]  
 (b) Calculate the equation of motion and solution of a damped single degree of freedom system with free vibration. [7M]
2. (a) State lumped mass idealization and explain it. [6M]  
 (b) Define [8M]
  - i. critical damping
  - ii. phase angle
  - iii. band width
  - iv. damped vibration

#### UNIT – II

3. (a) State D'Alembert's principle? Explain how the principle is employed in vibration problems. [7M]  
 (b) Develop the expression for the free vibration of an undamped 2DOF system. [7M]
4. Evaluate the natural frequency and mode shape of the two degree of freedom system shown in fig 1. [14M]

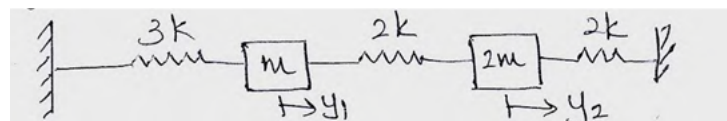


Figure 1

### UNIT – III

5. Analyze the Natural frequencies and mode shape for the given system and Check the orthogonality conditions. [14M]

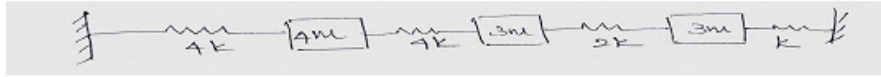


Figure 2

6. (a) Explain the procedure for mathematical modeling for a multi-degree freedom system. [8M]  
(b) Analyze the concept of orthogonality of normal modes. [6M]

### UNIT – IV

7. (a) Analyze the undamped free vibrations of beam in flexure. [7M]  
(b) Explain mode shapes of simple beams with different ends. [7M]
8. (a) Explain principle of applications to continuous beams [7M]  
(b) State holzer method and explain with example. [7M]

### UNIT – V

9. Explain excitation by rigid base translation for earthquake analysis. [14M]
10. Explain lumped mass approach in MDOF Systems. [14M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – I

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

## REHABILITATION & RETROFITTING OF STRUCTURES (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

### UNIT – I

1. (a) What do you mean by deterioration? Explain the mechanism of deterioration in concrete structures? [7M]
- (b) Explain the mechanism of various causes of deterioration in post-construction stage? [7M]
2. (a) Define repair, renovation, restoration, rehabilitation and retrofitting? Explain in detail the difference between them & where it is used? [7M]
- (b) What is distress? Give its classification. [7M]

### UNIT – II

3. (a) Explain in detail mechanism of damage in fresh state? Explain various causes of damage in fresh concrete? [7M]
- (b) Discuss in detail the cracking of hardened concrete? Explain various factors effecting hardened concrete? [7M]
4. (a) Explain the mechanism of corrosion; name the corrosion inhibitors and promoters? [7M]
- (b) Discuss in detail the factors affecting corrosion. What are its effects? [7M]

### UNIT – III

5. (a) Explain in detail different NDT tests for strength estimation of concrete? [7M]
- (b) Explain in detail various NDT tests for assessing corrosion potential of concrete? [7M]
6. (a) Explain the need for evaluation of structures? [7M]
- (b) Explain various symptoms for diagnosis of distress in concrete structures? [7M]

### UNIT – IV

7. (a) Enumerate the different methods available for repairs of concrete works. Discuss the any one in detail? [7M]
- (b) What is jacketing? What are the different types of jacketing? [7M]
8. (a) Explain strengthening and stiffening of beams and girders. [7M]
- (b) Explain the process of guniting in detail with figure. [7M]

## UNIT – V

9. (a) Explain the use of Smart sensor for monitoring civil engineering infrastructures. [7M]  
(b) Explain the methodology of health monitoring of structures and how is it monitored. [7M]
10. (a) Explain the components of health monitoring of structures. [7M]  
(b) Where Building Instrumentation are located? How? [7M]

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# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

## MODEL QUESTION PAPER – II

M.Tech II Semester Regular Examinations, April – 2017

**Regulation: R16**

## REHABILITATION & RETROFITTING OF STRUCTURES (Structural Engineering)

**Time: 3 Hours**

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

### UNIT – I

1. (a) What are the various categories of deterioration? [7M]  
(b) Discuss in detail the various factors responsible for deterioration. [7M]
2. (a) What is distress? Explain in detail the common types of distress in concrete structures? [7M]  
(b) What is the difference between rehabilitation and retrofitting? Define repair, renovation, restoration? [7M]

### UNIT – II

3. (a) Explain the cracking phenomena in plastic concrete. Give the remedial measures. [7M]  
(b) Explain in detail regarding mechanism of early thermal cracking in fresh concrete and their remedial measures. [7M]
4. (a) What are the factors effecting chloride induced corrosion, explain in detail mechanism of chloride induced corrosion and suggest suitable remedial measures? [7M]  
(b) Explain in detail cathodic corrosion protection, electrochemical chloride extraction, galvanic protection system. Suggest its suitability depending on the problem? [7M]

### UNIT – III

5. (a) Describe Electrical Resistivity Method and its influencing factors [7M]  
(b) Explain petrographic analysis and its application in civil engineering structures. [7M]
6. (a) Explain commonly used NDT tests and write its advantages over other tests. [7M]  
(b) Describe in detail the damage assessment procedure in Structure. [7M]

### UNIT – IV

7. (a) Explain various techniques in crack repair. [7M]  
(b) Numerate the various methods of placing concrete in underwater structures. Discuss the tremie pipe method in detail. [7M]
8. (a) Differentiate strengthening and stiffening of members. [7M]  
(b) Discuss the method of underpinning in detail. [7M]

## UNIT – V

9. (a) What do you understand by health monitoring of structures? Explain the advantages of Structures health monitoring. [7M]
- (b) Explain various smart materials and its application in structural health monitoring system. [7M]
10. (a) Discuss in detail different types of sensors and explain its significance in structural health monitoring? [7M]
- (b) Explain active and passive structural health monitoring of structures and differentiate between them. [7M]