SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.Sc. Semester: II/III
Title of the paper: Fundamentals of Computer Max. Marks: 80
Sub. Code: 30302/77202 (2005) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. What are the advantages of IC's?
2. What is a CPU? What are the various parts of the CPU?
3. What is a Cache memory?
4. What is an interrupt? What are its types?
5. What are the main characteristics of a memory cell?
6. What is a register?
7. What is an operating system?
8. Define the term "throughput" and "turnaround time" of a computer system.
9. What is an array? Give an example.
10. What do you mean by ternary operator?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Explain about the generation of computers.

(or)

12. Convert the following into decimals
    (a) $(0.1011)_2$ (b) $(111011.101)_2$

13. Explain about the processor to memory communication.

(or)

14. Explain the concept of virtual memory.

15. Explain the working principle of a CDROM.

(or)

16. Explain in detail about Read only memory.

17. Explain the various functions of an operating system.

(or)

18. Explain about the micro kernel based operating system.

19. Explain the various looping statements in C language.

(or)

20. Explain the data types in C language.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.E./B.Tech. Semester: VI
Title of the paper: Fuzzy Logic & Neural Networks Max. Marks: 80
Sub. Code: 14606 (2002/2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. Define the term "convexity" with respect to fuzzy sets.
2. Define extension principle.
3. What are the major components of a general fuzzy logic controller?
4. What are fuzzy vectors?
5. What is FAM?
6. Write an example for activation function.
7. What is perceptron?
8. Brief about the term "axon" in a nerve cell.
9. What is meant by unsupervised learning?
10. What is a discrete BAM?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. (a) Discuss the properties of fuzzy sets and various operations performed on it.

(b) Three fuzzy sets are as given below

$$\bar{A} = \frac{0.3}{30} + \frac{0.7}{60} + \frac{1.0}{100} + \frac{0.2}{150}$$

$$\bar{B} = \frac{0.2}{20} + \frac{0.4}{40} + \frac{0.6}{60} + \frac{0.8}{100} + \frac{0.1}{120}$$

$$\bar{C} = \frac{0.33}{500} + \frac{0.67}{1000} + \frac{1.0}{1500} + \frac{0.15}{1850}$$

(i) Applying the principle of Cartesian product, find the fuzzy relations between $\bar{A}$ and $\bar{B}$ and $\bar{C}$

(ii) Also obtain the max-min composition using the above fuzzy relations.

(or)

12. Discuss the different methods of defuzzification used in fuzzy logic systems with examples.

13. Write note on Fuzzy logic application to
(a) Washing machine
(b) Lift operation of multi-stored building

(or)

14. (a) Describe in detail the interface method of fuzzification. **(8)**

(b) State the properties of Fuzzy tolerance and equivalence. **(4)**

15. (a) What do you mean by generalized delta rule? Explain with the help of three-layer BPN architecture.

(b) Write the training algorithms of CPN.

(or)

16. (a) Explain the basic architecture of the Boltzman machine. **(5)**

(b) Discuss the training algorithms for Boltman machine with an example. **(7)**

17. (a) What do you mean by Hop field memory? Explain the two versions of Hop field memory. **(7)**
(b) Explain how to derive the continuous model energy function. (5)

(or)

18. (a) Draw and explain the BAM architecture and processing. **(7)**

(b) Prove the BAM energy theorem with an example. **(5)**

19. (a) What is adaptive resonance theory? Explain the basic ART architecture. **(5)**

(b) Draw the flowchart of the ART1 encoding algorithm for the binary inputs and explain the learning law for the L1-L2 connections. **(7)**

(or)

20. (a) Explain the methods for training weights in the necognitron. **(7)**

(b) Write short notes on optical neural network. **(5)**

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.E./B.Tech. Semester: II
Title of the paper: House Keeping – I Max. Marks: 80
Sub. Code: 76201 (2005) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. Define the term '' under repair room ''
2. Explain any two types of register and files maintained by housekeeping control desk.
3. Give short notes on maids cart.
4. Explain any two reportable matters list.
5. Give short notes on dirty dozen.
6. Write any two bed and bathroom supplies.
7. Write short notes on second service.
8. Define the term '' Dress Turn Out ''.
9. Give any two rules on a Guest floor.
10. What do you mean by Briefing?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Describe the structure of Briefing and scheduling of staffs in the Housekeeping department.

(or)

12. Draw the formats of Room and Check List and maintenance work orders.

13. Describe the structure of Linen room with the format.

(or)

14. Enumerate the procedure of Bed making in the hotel.

15. Describe the Procedures of the evening service in the housekeeping.

(or)

16. Write in details about the role of the housekeeping control desk.

17. Explain about the preparing a Room report with the format.

(or)

18. Explain and write in details about the storage tips and practices of linen with the format

19. How are the following cleaned?
    (a) Floor terraces (b) Elevators
    (c) Store room (d) Functions room

(or)

20. Describe the procedure of weekly cleaning and under repair room.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.E./B.Tech. Semester: VI
Title of the paper: Industrial Robotics and Automation Max. Marks: 80
Sub. Code: 24607 (2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. Define a "Robot".
2. State the six degrees of freedom associated with arm, body and wrist.
3. What is resolution of a robot?
4. Name any four electrical activators.
5. State the merits of ball screw over conventional power screw.
6. How the linear movement is calculated if the number of pulses and lead of the lead screw are known?
7. What is proximity sector?
8. Give a control scheme for robot control.
9. How robot can be used in assembly?
10. Differentiate between robot kinematics and robot dynamics.

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. (a) Define "End Effectors". **(2)**

(b) Sketch a mechanical gripper and explain the different types of mechanical gripper mechanisms. **(6)**

(c) Name the factors to be considered in the selection & design of grippers. **(4)**

(or)

12. (a) Sketch a robot and name the parts. **(4)**

(b) State the four basic configurations of robot and explain any two with suitable sketch. **(8)**

13. (a) Compare the characteristics of hydraulic and electrical drive for a robot. **(4)**

(b) Specify a stepper motor and give methods of drive employed for the motor. **(8)**

(or)

14. How the components of robot control systems are classified and explain all types in details.

15. Explain the principles of tactile matrix sensors with suitable sketches and examples.

(or)

16. Discuss the importance of the following elements of robot vision systems.

17. With neat sketches explain about the three basic types of robot work cells layouts.

(or)

18. Explain with examples about various techniques of robot cycle time analysis.

19. Discuss the use of robot for machine loading and unloading applications with suitable sketches.

(or)

20. Explain the use of robotics in the bio-medical field.

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Course: B.E./B.Tech. Semester: VI
Title of the paper: Instrumentation & Control in Petrochemical Industries Max. Marks: 80
Sub. Code: 17606 (2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. What is Reflux?
2. What are the types of gas chromotography?
3. Define degrees of freedom.
4. What is meant by fluidized bed?
5. What are the factors affects the Neutralization control of plant?
6. How stability in water treatment can be achieved?
7. What is NPSH?
8. What are the major classifications of pumps?
9. Define boiling point rise.
10. What is co-current operation in evaporator?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Explain in details about Batch oxidation of cyanide waste with chlorine.

(or)

12. Briefly explain calcium carbonate precipitation control system.

13. Explain the types of Evaporator. How the flow is maintained in Evaporator?

(or)

14. Write short notes on chain balance float Densitometer.

15. Briefly explain the throttling and ON-OFF control of reciprocating pump.

(or)

16. A pump is to be used to lift a liquid to a specific height. The pipe is subjected to two bends of 90º each. Explain how the required horse power of the pump can be estimated.

17. Explain any one methods of pressure control used in Distillation column.

(or)

18. Derive the expression for separation equation for dynamic internal flow model.

19. Write short notes on:
    (a) Fluid bed dryer
    (b) Cascade control of heat exchanger

(or)

20. Briefly explain the fixed heater & vaporizers in crude-oil refinery.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B. Arch. Semester: VI
Title of the paper: Interior Design Max. Marks: 80
Sub.Code: 21606 (2003) Time: 3 Hours

PART – A (8 x 4 = 32)

Answer **ALL the** Questions

Explain with sketches wherever necessary:

1. Highlight any 5 principles of interior design with an example for each.
2. Art Nouveau was a complete style which encompassed architecture, interior and furniture design. Discuss.
3. What are the considerations that determine the choice of ceiling finish for an interior? Suggest a suitable ceiling design for a bookshop.
4. Write about any two floor finishes (interior) in terms of properties and cost factors.
5. Highlight the importance of plants in interior design.
6. Discuss the importance of light as an element in interior design.
7. What do you understand by the following terms
   a.) Knock down furniture
   b.) Systems furniture
8. Discuss in detail any one type of office furniture system.

PART – B (4 x 12 = 48)

Answer **ALL the** Questions

Explain with sketches wherever necessary:

9. Considering that you are the interior designer for following space, discuss the design aspects , suggest a preliminary scheme,

workout the nature of the finishes, furniture and any other details. Give plans, elevations, etc and a perspective (interior) view.
Bookshop measuring 6m x 9m with 3m clear height.

OR

10. What are the important design considerations involved in the design of an interior for a Jewellery shop in a shopping centre.

11. Interior Design is a composite effect of different influences – culture & inspirations of people, prevailing technology & modes of construction, stylistic tendencies, etc. Discuss with reference to any 5 different periods in history.

OR

12. What are the categories into which materials of flooring can be classified ? Describe the characteristics and uses of some materials under each category .

13. What are the considerations for choosing an appropriate lighting system? List & explain the different types of lamps & lighting fixtures available in the market.

OR

14. Lighting is an important design element that functionally, aesthetically, & psychologically transforms an interior space. Elaborate.

15. Write short notes on:
    a. Bauhaus Furniture.
    b. Materials for Furniture
    c. Display Furniture

OR

16. Discuss the "Open plan office" of the present . Trace its origin from the "office land - scape" type and show how "systems furniture" helped in its evolution

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B. B. A | Semester: II
Title of the paper: Macro Economics | Max. Marks: 80
Sub.Code: 28201 (2004) | Time: 3 Hours

PART – A (3 x 5 = 15)
Answer **ANY FIVE** Questions

1. Define Macro Economics.
2. What do you mean by wealth?
3. What is multiplier?
4. What do you infer from re-inflation?
5. What is monetarism?
6. Write note on post-liberalisation.
7. What is meant by Balance of Payments.

PART – B (5 x 5 = 25)
Answer **ANY FIVE** Questions

8. Write the scope of macro Economics.
9. What are the factors determining the size of savings?
10. List out the different types of investment and explain its nature.
11. What are the characteristics of business cycle?
12. How the money is supplied during great depression?
13. Differentiate internal and international trade.
14. Differentiate between Monetary and fiscal policy.

PART – C (4 x 10 = 40)

Answer **ANY FOUR** Questions

15. Explain the various approaches used in calculating national income.
16. What are the determinants of consumption function?
17. List out the limitations and leakages in multiplier.
18. Illustrate the various phases of business cycle.
19. Explain the macro economic scene in India.
20. Name any five Nobel Prize winners and their contribution to economics.

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Course: M. Sc. Semester: III

Title of the paper: Management Information System Max. Marks: 75

Sub.Code: 61301 (2003) Time: 3 Hours

PART – A (5 x 5 = 25)

Answer ALL the Questions

1. a) Explain the role of performance standard and "feedback" in effective management of business.

(or)

b) Designing an MIS is an art and not a science.

2. a) Differentiate between an open and closed system.

(or)

b) Explain system efficiency and effectiveness with an example.

3. a) What are the contents of MIS plan?

(or)

b) Distinguish between manufacturing sector and service sector.

4. a) What are the different levels of processing required to meet the informational needs?

(or)

b) What is normalization of the data?

5. a) What is a middleware? Why it is required?

(or)

b) Write short note on business process.

PART – B (5 x 10 = 50)

Answer **Any FIVE** Questions

6. What are the different types of strategic management?

7. What are different environmental factors that influence the managerial decisions?

8. Write short notes on:
   (a) Information Presentation
   (b) Classification of Information.

9. In detail, explain how to handle a complex system.

10. How will you ascertain the class of information?

11. Explain the different levels of processing required to meet the information needs?

12. How database design is done? What are the steps involved in it?

13. Write about the client-server implementation strategies.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: M. Sc. Semester: III

Title of the paper: Management Information System Max. Marks: 75

Sub.Code: 71804 (2002) Time: 3 Hours

PART – A (5 x 5 = 25)

Answer ALL the Questions

1. a) Define MIS in the context of today's business world.

(or)

b) Give reasons for using computer for MIS in the organization.

2. a) Explain Herbert A. Simon model of a decision making process.

(or)

b) Discuss briefly the need for system analysis.

3. a) Why is the long range plan of MIS necessary ?

(or)

b) Write short note on the principles of distinctive service.

4. a) Write short note on TQM of information systems.

(or)

b) Explain briefly the concept of database.

5. a) Explain the concept of client-server architecture.

(or)

b) What is the role of IT in BPR?

PART – B (5 x 10 = 50)

Answer **Any FIVE** Questions

6. What is the meaning of strategic management? What are the different types of this Approach?

7. Write short notes on:
   (i) Organizing
   (ii) Staffing

8. Explain the law of Requisite Variety. What are the methods for deciding decision alternatives?

9. Write in detail about system development models.

10. What are the different methods of determining the information requirements?

11. Write in detail about TQM of information systems.

12. Explain the different levels of processing required to meet the information needs?

13. Write about the client-server implementation strategies.

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.Sc. Semester: II
Title of the paper: Maths – II Max. Marks: 80
Sub. Code: 29201 (2005) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. Give the equations of two regression equations
2. Establish the relation between correlation and regression coefficients.
3. Give the multiplication theorem for conditional probability
4. What is the chance that a leap year selected at random contains 53 Sundays?
5. Derive the mean of binomial distribution
6. X is uniformly distributed with mean 1 and variance 4/3, find $P(X < 0)$.
7. Define the two types of errors in testing of hypothesis
8. Give the one way ANOVA table
9. Write the procedure for sign test
10. Give the test statistic for Kruskal Wallis H test.

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. (a) Calculate the coefficient of correlation between X and Y for the following data:

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

(b)In a study of the effect of a dietary component on plasma lipid composition, the following ratios were obtained on a sample of experimental animals

Measure of dietary component (X)	1	5	3	2	1	1	7	3
Measure of plasma lipid level (Y)	6	1	0	0	1	2	1	5

(i) obtain the two regression lines and hence predict the ratio of plasma lipid level with 4 dietary component.

(OR)

12. Fit a parabola to the following data:

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

13. (a) A committee of 4 people is to be appointed from 3 officers of the production department, 4 officers of the purchase department, two officers of the sales department and 1 chartered accountant. Find the probability of forming the committee in which there must be one from each category

(b) A bolt is manufactured by 3 machines A, B and C. A turns out twice as many items as B, and machines B and C produce equal number of items. 2% of bolts produced by A and B are defective and 4% of bolts produced by C are defective. All bolts are put into 1 stock pile and chosen from this pile. What is the probability that it is defective?

(OR)

14. (a) An urn contains 5 red, 6 blue, and 8 green balls. If a set of 3 balls is randomly selected, what is the probability that each of the ball will be (a) of the same color; (b) of different colors?

(b) Urn I has 2 white and 3 black balls, urn II has 4 white and 1 black balls and urn III has 3 white and 4 black balls. An urn is

selected at random and a ball drawn at random is found to be white. Find the probability that urn I was selected.

15. Derive the mean and variance of Exponential Distribution

(OR)

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

(b) In a certain city, the daily consumption of electric power in millions of kilowatt hours can be treated as a random variable having an Erlang distribution with parameters (1/2,3). If the power plant of this city has a daily capacity of 12 millions kilowatt hours, what is the probability that this power supply will be inadequate on any given day?

17. The following table shows sample retail prices, in rupees for three brands of shoes. Use the Kruskal-Wallis test to determine whether there is any difference among the retail prices of the brands throughout the country. Use the 0.01 level of significance.

Brand A	89	90	92	81	76	88	85	95	97	86	100
Brand B	78	93	81	87	89	71	90	96	82	85	
Brand C	80	88	86	85	79	80	84	85	90	92	

(OR)

18. (a) The height of 10 persons are given below: Check whether the data supports the claim that the mean height is 178 cms. Use Wilcoxon's signed rank test.

171, 175, 177, 178, 180, 182, 190, 192, 195, 202

(b) Consider the data: 7, 11, 15, 12, 4, 10, 19, 22, 25, 15, 17, 20, 23, 28. Test the hypothesis H_0 : Median = 15 against H_1: Median>15 at 5% level of significance

19. 1000 students at college level were graded according to their I.Q. and their economic conditions. What conclusion can you draw from the following data:

Economic Conditions	**I.Q.Level**	
	High	**Low**
Rich	460	140
Poor	240	160

(OR)

20. Two random samples gave the following information

Sample	**Size**	**Sample Mean**	**Sum of Squares of deviations from the means**
I	10	15	90
II	12	14	108

Test whether the samples come from same normal population.

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Course: B.E./B.Tech. Semester: VI
Title of the paper: Microcontroller and Embedded Systems
Max. Marks: 80
Sub. Code: 13606 (2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. What is micro controller.
2. Explain $\overline{EA}$ signal in 8051.
3. List the bit jump instructions available in 8051.
4. Write true or false for the given statement.
   a)MOV A,@R2 is valid instruction.
   b)B register is used in multiplication and division operations only
5. What are the 2 modes of configuration in 8096 μc.
6. What are the different data types supported by 8096 μc.
7. What is hard real time embedded system?
8. Explain video codecs.
9. Give 4 examples for embedded system used in consumer electronics field.
10. What are the programming languages used in embedded systems?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Explain with neat diagram the architecture of 8051.

OR

12. Explain in details about interrupts in 8051.

13. Write the following programs in 8051.

a) To transfer 10 data from internal memory to external memory.
b) To convert ASCII data to HEX data.

OR

14. Explain the following instructions in 8051 with example.
a)MOVC A,@DPTR b)SWAP A
c)DJNZ add, radd d)CJNE A, add, radd
e)RRC A f)ORL c, b

15. Explain the RALU block diagram of 8096.

OR

16. Explain briefly the block diagram of 8096.

17. Explain the following categories of embedded system.
a) Stand alone embedded system
b) Networked appliances
c) Mobile devices

OR

18. Discuss the following issues in embedded software development
a) Co-design
b) Embedding an operating system
c) Efficient input/output

19. Explain with block diagram
a) Interactive voice response system (7)
b) Virtual instruments (5)

OR

20. Explain with block diagram
a) Automatic speech generation system (4)
b) multimedia over IP networks (8)

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Course: B.E./B.Tech. Semester: VI
Title of the paper: Microcontroller Max. Marks: 80
Sub. Code: 25602 (2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. Size of the internal RAM of 8051-----
2. Name the 16-bit data addressing registers and their function.
3. List the registers of the 8051µc.
4. The flag register in the 8051 is called-------
5. Give the state of RS, E and R/W when sending a command code to the LCD.
6. Define conversion time
7. What is RALU?
8. Define Power Down RAM
9. Define Baud rate.
10. How many I/O ports are available in 8096?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Draw and explain the block diagram of 8051.

(or)

12. What are the various modes available for Timers? Explain each mode.

13. Explain addressing modes of 8051 with the help of suitable example.

(or)

14. Describe the action associated with PUSH and POP instruction.

15. Draw and explain the block diagram of interface an LCD to the 8051.

(or)

16. Explain stepper motor interfacing with neat diagram

17. List the features of 8096.Explain the architecture of 8096 with the help of neat block diagram.

(or)

18. Draw and Explain internal RAM structure of 8096. Write short notes on Timers available in 8096.

19. What are the major I/O functions provided by 8096?

(or)

20. Explain the interrupt structure of 8096.

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Course: B.E./B.Tech. Semester: VI
Title of the paper: Modern Construction Techniques Max. Marks: 80
Sub. Code: 20606 (2003) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. List down the advantages of using wall panels.
2. Write short notes on ferrocement.
3. Write short notes on under reamed pile?
4. Write short notes on Underpinning?
5. What do you mean by pre-tensioning of concrete members?
6. Mention few applications of Ground Anchors.
7. Write short notes on Tower Crane?
8. List down the methods to improve productivity.
9. What do you understand by setting out of bridges?
10. Write the construction sequence of Cable Stayed Bridges?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. Name few cost effective techniques used in the construction of low-cost housing.

OR

12. Explain in general the construction sequence of prefabricated units?

13. What are the different types of techniques used for permanent exclusion of water?

OR

14. Explain the principle of construction of pneumatic caisson?

15. List down the different types of pre-stressing technique.

OR

16. Explain with neat sketches the components and working of
    (i) Gifford-Udall system (ii) Magnel Blaton system
    (iii) Lee-Mc Call system (iv) Freyssinet System

17. What are the different types of equipments used for earth moving?

OR

18. Describe the operation and utility of the following
    (i) Jack (ii) Fork Truck (iii) Clamshell (iv) Sheep foot roller

19. Explain in detail the erection scheme involved in Continuous span Bridges?

OR

20. a) Enumerate the purpose of providing bearing in bridges
    b) Explain with neat sketch the steps involved in balanced cantilever segmental construction?

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY
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Course: B.E./B.Tech. Semester: V
Title of the paper: Operating Systems Max. Marks: 80
Sub. Code: 12503 (2001) Time: 3 Hours

PART – A (10 x 2 = 20)
Answer ALL the Questions

1. List the basic functions of operating system.
2. What is resource descriptor?
3. Explain process Hierarchy.
4. Define throughput.
5. What is IPC?
6. Differentiate between synchronous and asynchronous send semantics.
7. Explain run time bound checking.
8. Define thrashing.
9. What are the operations performed on a byte-stream file?
10. What is the scheduling method in windows NT?

PART – B (5 x 12 = 60)
Answer ALL the Questions

11. List and explain the factors to be considered in Operating System design.

(or)

12. Explain the various functions of operating system.

13. Explain the basic organization of a scheduler.

(or)

14. List the important factors in scheduling and explain with example and gantt chart FCFS, SRT, priority (P & NP), Round Robin and Deadline scheduling.

15. Explain readers-writers problem.

(or)

16. Explain the various conditions to prevent the occurrence of deadlocks.

17. Describe paging in detail.

(or)

18. Write short notes on:
    (a) Multilevel paging
    (b) Inverted page table
    (c) Shared pages.

19. Briefly explain the concept of cryptography.

(or)

20. Write short notes on
    (a) Program threats
    (b) System threats
    (c) User authentication