

**T.Y.B.SC (IT) SEM-VI**  
**DATA WAREHOUSING**

**(JAN-2020)**

**(3 Hours)**

**[Total Marks: 100]**

- N. B.: (1) **All questions are compulsory.**  
 (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.  
 (3) Answers to the **same question** must be **written together.**  
 (4) Numbers to the **right** indicate **marks.**  
 (5) Draw **neat labeled diagrams** wherever **necessary.**  
 (6) Use of **Non-programmable** calculators **is allowed.**

1. **Attempt any two of the following:** **10**  
 a. List the reasons why metadata is very important in DW 2.0 architecture.  
 b. Write short note on Data Warehouse Monitor.  
 c. Discuss ELT and the drawbacks associated with it.  
 d. List and explain the main functions of Granularity Manager.
2. **Attempt any three of the following:** **15**  
 a. Explain the flow of data through DW 2.0 environment.  
 b. Explain Spider Web Environment.  
 c. List and briefly explain the drawbacks of active data warehouse.  
 d. Differentiate between early generation data warehouse and DW 2.0.  
 e. List the challenges in integrating unstructured data in DW 2.0 environment.  
 f. List the important features of a data warehouse and also discuss its advantages.
3. **Attempt any three of the following:** **15**  
 a. Explain the two basic types of metadata repositories.  
 b. What is exploration facility? List its sources of data.  
 c. Explain why Spiral methodology is preferred to develop DW 2.0? Mention its key features.  
 d. Compare and contrast between Local and Enterprise Metadata.  
 e. Discuss internal and external taxonomy in the unstructured DW 2.0 with the help of an example.  
 f. What are the uses of statistical analysis performed on the data in DW 2.0?
4. **Attempt any three of the following:** **15**  
 a. Explain the scope and role of ETL Data Quality Monitor.  
 b. Explain the different levels of a data model.  
 c. Discuss the transformation of data model across different sectors.  
 d. Which security measures are employed for Data Warehouse?  
 e. Explain the data models applied to unstructured data.  
 f. List and briefly explain features of transaction monitor.
5. **Attempt any three of the following:** **15**  
 a. List the characteristics of discrete data and continuous time span data.

**[Turn Over]**

- b. How is rejected data handled in ETL processing?
- c. What is Changed Data Capture in ETL? Explain.
- d. Write a short note on Exception based flow of data.
- e. Discuss the measures through which throughput of ETL processing can be improved?
- f. Explain how the ETL acts in Online and Batch mode.

**6. Attempt *any three* of the following:**

**15**

- a. Explain the different ways in which data warehouse can be migrated to DW 2.0.
- b. Differentiate between data granularity management and ETL processing.
- c. Distinguish between Online Response Time and Analytical Response Time.
- d. Explain concept of Batch Parallelization.
- e. Granularity Manager should be home grown or third party? Justify.
- f. Differentiate between Farmers and Explorers of data in DW 2.0.

**7. Attempt *any three* of the following:**

**15**

- a. Write note on ETL management.
  - b. Explain Bitmapped and B-Tree indexing in detail.
  - c. Explain briefly the three main subjects in user training material.
  - d. Discuss the conditions beneficial for pilot deployments.
  - e. Describe any five types of pilot deployment projects indicating main purpose of each.
  - f. Explain briefly any 5 techniques for optimizing physical storage.
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**T.Y.B.SC (IT) SEM-VI**  
**DIGITAL SIGNALS & SYSTEMS**  
**(JAN- 2020)**

Code: 70901 / Digital Signals and Systems.

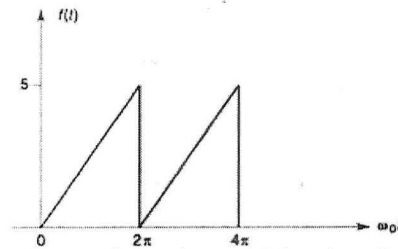
(3 Hours)

[Total Marks: 100]

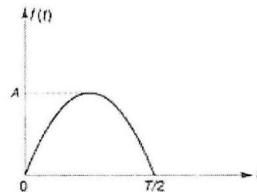
- N. B.: (1) All questions are compulsory.  
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 (5) Draw neat labeled diagrams wherever necessary.  
 (6) Use of Non-programmable calculators is allowed.

1. **Attempt any two of the following:** 10
- Find the Laplace transform of  $\text{Cos}^3 3t$
  - With reference to z-Transform, state initial and final value theorems.
  - What is convolution in Linear Time Invariant System? What are the properties of convolution?
  - Distinguish between linear convolution and circular convolution.

2. **Attempt any three of the following:** 15
- State any ten properties of unit impulse function  $\delta(t)$ .
  - What are the different manipulations of discrete time signals? Explain with examples.
  - Determine the exponential Fourier Series for the waveform shown below:



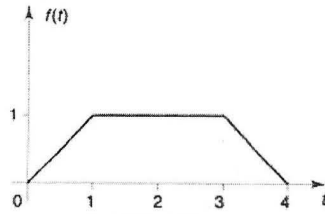
- d. Determine the Fourier transform of the sinusoidal pulse shown below:



- What is signal processing? What is Digital Signal Processing?
- What are the advantages and disadvantages of Digital signal processing over analog signal processing?

3. **Attempt any three of the following:** 15

- Find the Laplace transform of  $\text{Sin}at \cdot \text{Sin}bt$
- Find the inverse Laplace transform of  $\left\{ \frac{s^2 - s - 3}{(s + 5)(s + 4)^2} \right\}$
- Find the Laplace transform for the following signal:



- d. Draw the pole-zero plot for  $V(s) = \frac{(s+1)(s+3)}{(s+2)(s+4)}$ . Evaluate  $v(t)$  by using the pole-zero diagram. Confirm the result analytically.
- e. Discuss final value theorem in Laplace transform domain.
- f. Find the Laplace transform of Cosine function from the definition of Laplace transform.

4. Attempt any three of the following:

15

- a. Find the z-transform of the following: i.  $nu(n)$  ii.  $na^n u(n)$
- b. By first differentiating  $X(z)$  and then using appropriate properties, determine  $x(n)$  for  $X(z) = \log(1 - 2z) |z| < \frac{1}{2}$
- c. Determine the inverse z-transform of

$$X(z) = \frac{1}{(z+2)^2}; |z| < \frac{1}{2}$$

- d. Determine the causal signal having z-transform  $X(z) = \frac{z^2+z}{(z-\frac{1}{2})^3(z-\frac{1}{4})}$  for the region of convergence  $|z| > \frac{1}{2}$
- e. Define one-sided z-Transform, Two-sided z-Transform and Inverse z-Transform.
- f. State any five properties of Region of Convergence (ROC) for the z-Transform.

5. Attempt any three of the following:

15

- a. Find the convolution of the two signals  $x(n) = u(n)$  and  $h(n) = a^n u(n)$ , ROC:  $|a| < 1; n \geq 0$
- b. Determine the impulse response and unit step response of the system described by the difference equations
  - i.  $y(n) = 0.6y(n-1) - 0.08y(n-2) + x(n)$
  - ii.  $y(n) = 0.7y(n-2) - 0.1y(n-2) + 2x(n) - x(n-2)$
- c. Find the impulse response, frequency response, magnitude response and phase response of the second order system characterised by the difference equation:

$$y(n) - y(n-1) + \frac{3}{16}y(n-2) = x(n) - \frac{1}{2}x(n-1)$$

- d. Consider a causal and stable LTI system whose input  $x(n)$  and output  $y(n)$  are related through the second order difference equation

$$y(n) - \frac{1}{12}y(n-1) - \frac{1}{12}y(n-2) = x(n)$$

Determine the step response for the system.

- e. Show that the system described by the differential equation  $\frac{dy(t)}{dt} + 10y(t) + 5 = x(t)$  is non-linear.
- f. Determine whether the system described by  $F[x(n)] = a[x(n)]^2 + b x(n)$  is linear and time invariant.

6. Attempt *any three* of the following:

15

- a. Compute the circular periodic convolution graphically of the two sequences:  

$$x(n) = \delta(n) + \delta(n - 1) - \delta(n - 2) - \delta(n - 3)$$

$$h(n) = \delta(n) - \delta(n - 2) + \delta(n - 4)$$
- b. An FIR digital filter has the unit impulse response sequence,  $h(n) = \{2, 2, 1\}$ . Determine the output sequence in response to the input sequence  $x(n) = \{3, 0, -2, 0, 2, 1, 0, -2, -1, 0\}$  using the overlap-add convolution method.
- c. Given  $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ . Find DFT using DIT FFT algorithm.
- d. Compute the circular periodic convolution graphically of the two sequences:  
 $h(n) = \{1, 2, 4\}$  and  $x(n) = \{1, 2\}$
- e. Determine the Circular Correlation values of the two sequences  $x(n) = \{1, 0, 0, 1\}$  and  $h(n) = \{4, 3, 2, 1\}$ .
- f. Define Discrete Fourier Transform (DFT) for a sequence  $x(n)$ . State any three properties of DFT.

7. Attempt *any three* of the following:

15

- a. What is IIR filter? What are the advantages of FIR filter over IIR filters?
- b. Write a short note on Butterworth filters.
- c. Determine the unit sample response of the ideal low pass filter? Why is it not realizable?
- d. Design a digital Chebyshev filter to satisfy the constrains  

$$0.707 \leq |H(e^{j\omega})| \leq 1, \quad 0 \leq \omega \leq 0.2\pi$$

$$|H(e^{j\omega})| \leq 0.1, \quad 0.5\pi \leq \omega \leq \pi$$
 Using bilinear transformation and assuming  $T = 1s$ .
- e. What is Window technique? Define Rectangular window functions.
- f. Design a Finite Impulse Response low pass filter with a cut-off frequency of 1kHz and sampling rate of 4kHz with eleven samples using Fourier series.

**T.Y.B.SC (IT) SEM-VI**

**- : ELECTIVE :-**

**GIS**

**(JAN- 2020)**

**(3 Hours)**

**[Total Marks: 100]**

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 (6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt any two of the following:** **10**
  - a. What is GIS? What are the GIS applications?
  - b. State the all GIS operations and explain any two.
  - c. Describe RGB and CMYK in details.
  - d. What is metadata? Explain.
  
2. **Attempt any three of the following:** **15**
  - a. Explain Geographic Coordinate System.
  - b. Write short notes on i) Datum ii) Cell Value iii) Cell size.
  - c. Explain the components of GIS.
  - d. Explain Vector Data Model.
  - e. Explain the run length encoding with example.
  - f. What is map projection? Explain the types of map projections.
  
3. **Attempt any three of the following:** **15**
  - a. Write short notes on :  
 i) U.S. geological Survey ii) Federal Geographic data Committee
  - b. Explain Root Mean Square (RMS) error in detail.
  - c. State the various transformation methods. Explain Affine method.
  - d. Explain the concept of 'Resampling of Pixel Values', the methods and the advantages of Resampling.
  - e. Explain Map-to-Map and Image-to-Map transformations.
  - f. What are the methods of creating new GIS Data? Explain.
  
4. **Attempt any three of the following:** **15**
  - a. Explain the term 'Cartographic Symbolization' with its various aspects.
  - b. Explain the various types of maps in GIS Packages.
  - c. What is the Typography? Explain the role of Typography in GIS.
  - d. Explain the process of Map Production.
  - e. How to manipulate fields of Attribute Data in GIS?
  - f. Explain types of relationships among database tables.
  
5. **Attempt any three of the following:** **15**
  - a. Explain the any two types of graph.
  - b. Describe the descriptive statistics.
  - c. Explain the different types of graphs used in data exploration.
  - d. Explain the term 'Attribute Data Query' with its various aspects.
  - e. Write short note on i) Spatial aggregation ii) Map comparison
  - f. Explain the 'Spatial Data Query' with feature selection by spatial relationship aspects.

**6. Attempt any three of the following:**

**15**

- a. What is buffering? Explain its variations.
- b. What is overlay? Explain feature types and overlay operations.
- c. What are Slivers? How can they be resolved?
- d. Explain various techniques for Map Manipulation with diagram.
- e. Explain neighborhood operations and neighborhood statistics with example.
- f. Explain Zonal Operations and its applications in Raster Data.

**7. Attempt any three of the following:**

**15**

- a. What is Spatial Interpolation? State the classifications of spatial interpolation.
- b. Explain Thiessens Polygons with suitable diagram.
- c. Explain Density Estimation process in Spatial Interpolation.
- d. What is semivariogram.
- e. Write short note on Thin plate splines.
- f. Explain Kriging and its ordinary kriging technique.

**T.Y.B.SC (IT) SEM-VI**  
**- : ELECTIVE :-**  
**IPR AND CYBER LAWS**  
**(JAN-2020)**

(3 Hours)

[Total Marks: 100]

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 (6) Use of Non-programmable calculators is allowed.

1. **Attempt any two of the following:** 10
  - a. Explain Semiconductor chip protection act in detail.
  - b. Define copyright. Explain different rights conferred by copyright.
  - c. Explain cyber jurisprudence.
  - d. What does IT Act 2000, "Miscellaneous" talk about?
  
2. **Attempt any three of the following:** 15
  - a. Discuss "International Background of intellectual property rights"
  - b. What are the objectives behind Indian patent law?
  - c. Explain the basic steps of applying patent.
  - d. Explain the basic principles of design law.
  - e. What is patent? Explain criteria for patentability.
  - f. Enumerate the basic principles of Trademark.
  
3. **Attempt any three of the following:** 15
  - a. Explain the US safe harbor principles.
  - b. Explain the computer software as intellectual property and its protection.
  - c. Discuss copyright issues in digital media.
  - d. Write a short note on WIPO treaty.
  - e. Explain trade related aspects of IPR.
  - f. Write steps in domain name registration process.
  
4. **Attempt any three of the following:** 15
  - a. Explain the main features of Copyright act 1957.
  - b. What are the defenses available in case of infringement of trademark?
  - c. What are the different kinds of assignments? Explain briefly.
  - d. What are the rights granted for registration of design?
  - e. What are the duties of a patentee?
  - f. Explain "Protecting goodwill through trademark".
  
5. **Attempt any three of the following:** 15
  - a. What is IP licensing? What are the different types of IP licensing formats?
  - b. Explain the criminal remedies in enforcing intellectual property rights.
  - c. What are general obligations for enforcement of intellectual property rights?
  - d. What are the practical aspects of licensing?
  - e. Explain the advantage and disadvantage of IP licensing?
  - f. Discuss the enforcement of IPR with reference to border security measure.

[Turn Over]



6. **Attempt any three of the following:** 15
- a. What is E-Governance? Write advantages of E-Governance.
  - b. What is digital signature? How is digital signature verified?
  - c. What is a need of cyber law and cyber security?
  - d. What is domain name? Explain uniform domain name dispute resolution policy.
  - e. Explain copyright in World wide web.
  - f. Explain the term privacy. What are privacy issues for data and software?
7. **Attempt any three of the following:** 15
- a. What are the objectives of IT act 2000?
  - b. Discuss offences and punishments covered in IT act 2000.
  - c. What are the duties of subscriber of digital signature certificate?
  - d. What is cyber appellate tribunal? What is its power?
  - e. When was IT Act 2000 amended? Enlist the major changes incorporated in the amendments.
  - f. Explain the issues in cyber evidence management.
-

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(5) Draw **neat labeled diagrams** wherever **necessary**.  
(6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt any two of the following:** 10  
a. Explain the concept of the principle “change Management Environment “of modern process of software management.  
b. Explain the metrics automation process.  
c. Why tailoring of a process is an important aspect of software development system?  
d. Why periodic status assessment serves as project snapshot?
2. **Attempt any three of the following:** 15  
a. Explain Waterfall model in detail.  
b. Write short note on peer inspection.  
c. Explain the process of cost estimation.  
d. Explain Boehm’s staffing principles.  
e. List and Explain the three generation of software development.  
f. Explain three different process perspective of improving software processes.
3. **Attempt any three of the following:** 15  
a. Explain the process of team cohesion.  
b. List the principles of modern software system.  
c. Explain Engineering stage in life cycle phases.  
d. What are the artifacts? How artifacts are organized into different sets of the system?  
e. Write a note on management perspective architecture.  
f. Write a note on transition phase with its primary objectives
4. **Attempt any three of the following:** 15  
a. List top level workflow of the software process and explain them.  
b. What role milestones play in the development of the system?.Explain  
c. Explain the flaws incurred in conventional work breakdown structure  
d. Explain the process of cost and schedule estimation.  
e. Why periodic assessment is must for the successful development of the software?  
f. Write a detailed note on iteration workflow with the help of diagram.
5. **Attempt any three of the following:** 15  
a. What are the main features of Line of business organization in developing software?  
b. Write a note on software Engineering Process Authority (SEPA).  
c. Compare the life cycle focus of project organization in regard to software architecture team activities.  
d. Explain the three discrete states from which the project environment artifact evolved.  
e. Explain round trip Engineering.  
f. Why automation of process is important in software development project?

6. **Attempt *any three* of the following:** **15**
- a. Explain the purpose of seven core metrics
  - b. Explain different features of process discriminates
  - c. Explain why tailoring of the process is required.
  - d. Compare between small-scale and large-scale projects.
  - e. Why process control and instrumentation is required in software development process.
  - f. State and explain the four primary indicators of quality.
7. **Attempt *any three* of the following:** **15**
- a. Explain the process of denouement.
  - b. Differentiate between potential solutions through cost estimation.
  - c. Explain the effect of 80-20 rule over the development of the project.
  - d. What are software management best practices?
  - e. Explain the breakthroughs in the next generation system for supporting technological environment.
  - f. State the characteristics of modern interactive development process.
-

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1. **Attempt any two of the following:** 10
  - a. List and Explain any five functions of Network Layer in OSI model.
  - b. Compare between IPV4 and IPV6 header.
  - c. What are the different types of links in OSPF? Explain.
  - d. Explain the use of any 5 commands in SMTP.
  
2. **Attempt any three of the following:** 15
  - a. Write a note on classless address in IPV4.
  - b.
    1. Convert the IPv4 address 13.123.255.8 into binary notation
    2. Identify the class of IPV4 address 24.192.128.0
    3. Identify the error in IPV4 address 300.12.45.78
    4. Convert the IPV4 address 10100101.10101010.11110000.00001111 to dotted decimal notation.
    5. Compress the following IPV6 address AABB:0:0:0:0:0:0:CCDD
  - c. Explain the concept of subnetting and supernetting.
  - d. Write a note on Network Address Translation (NAT).
  - e. Explain the three transition strategies from IPV4 to IPV6.
  - f. Draw a neat and labeled diagram of IPV4 Packet format.
  
3. **Attempt any three of the following:** 15
  - a. Explain the working of ARP.
  - b. Write a note on Internet Control Message Protocol (ICMP).
  - c. Explain the three phases a mobile host goes through in communicating with remote host.
  - d. Using suitable example, explain Link State Routing.
  - e. Discuss the Three-Node infinity problem with its solution.
  - f. Explain the different timers used in RIP.
  
4. **Attempt any three of the following:** 15
  - a. Explain the services of TCP.
  - b. The following is a dump of a UDP header in hexadecimal format.  
**CB8400D001C001C**
    - i. What is the source port number?
    - ii. What is the destination port number?
    - iii. What is the total length of the user datagram?
    - iv. What is the length of the data?
    - v. Is the packet directed from a client to a server or vice versa?
  - c. Write a note on UDP package.
  - d. Write a short note on connection establishment using handshaking in TCP.
  - e. Explain the different options in TCP.
  - f. What is SCTP Association? Explain the step involved in association establishment.
  
5. **Attempt any three of the following:** 15
  - a. Write a short note on FTP.
  - b. List and explain any five file management commands in FTP.
  - c. Explain DHCP operation on different network.
  - d. Using suitable diagram explain DHCP client transition diagram.

- e Explain Recursive resolution and Iterative resolution in DNS.
- f Define the following w. r. t. DNS
  - i. Name Space
  - ii. Label
  - iii. Fully Qualified Domain Name
  - iv. Partially Qualified Domain Name
  - v. Domain

**6. Attempt any three of the following:**

15

- a. What are the different types of messages in TFTP? Explain using message format.
- b. Write a short note on WWW.
- c. Explain the response format in HTTP. Also explain status codes and phrases.
- d. Write a short note on E-Mail communication using SMTP.
- e. Explain MIME content type and content transfer encoding.
- f. Using suitable example explain Internet Audio/Video.

**7. Attempt any three of the following:**

15

- a. Differentiate between Connection oriented and connection less programming model in client server programming.
- b. Write a client server TCP Program to check whether a number is prime or not.
- c. Explain the java.net.ServerSocket class with its constructor and methods.
- d. What is a Datagram? Explain java.net.DatagramPacket class with its constructors and methods.
- e. Write a client server UPD program to send and receive "Hello World" message.
- f. Explain using suitable diagram how UDP socket programming works.