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(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Information Technology

IT 010 601—COMPUTER NETWORKS (IT)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Outline the functions performed by a bridge.
2. Write a note on dynamic channel allocation.
3. State the optimality principle.
4. Outline the functions performed by the transport layer.
5. What is a scatternet ? Give example.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Write a note on low earth orbit satellites.
7. Appraise with an example the working of slotted ALOHA protocol.
8. What is flooding ? Outline the pros and cons of flooding.
9. Write a note on TCP support for reliable delivery.
10. Outline the top-level internet domains and their meaning.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. Appraise with a diagram the functions performed by each layer of the TCP / IP reference model.

Or

12. What is ISDN ? Appraise with a diagram the ISDN architecture.

13. Appraise with an example sliding window protocol using go back-n and sliding window protocol using selective repeat.

Or

14. Appraise with an example the working of persistent carrier sense multiple access protocol, non-persistent carrier sense multiple access protocol and carrier sense multiple access protocol with collision detection.

15. What is multicasting ? Appraise with an example link state multicasting algorithm.

Or

16. What is congestion control ? Appraise with an example any *two* congestion control algorithms.

17. (a) Appraise with a diagram the steps in establishing a TCP connection. (6 marks)

- (b) Write a note on TCP retransmissions. (6 marks)

Or

18. What is asynchronous transfer mode ? Appraise the principle characteristics of asynchronous transfer mode.

19. What is electronic mail ? Appraise with a diagram the working of simple mail transfer protocol.

Or

20. What is Bluetooth ? How Bluetooth technology works? Give example.

(5 × 12 = 60 marks)

G 1900

(Pages : 2)

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B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Information Technology

IT 010 604—SOFTWARE ENGINEERING (IT)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. For what types of project spiral model can be used ?
2. What are analysis patterns ?
3. Define procedural abstraction and data abstraction.
4. What is regression testing ?
5. Define process metrics. Give example.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Present an overview of aspect-oriented software development.
7. Outline the work products produced as a result of requirements elicitation.
8. What is architectural design ? Give example.
9. Explain alpha testing and beta testing.
10. How can software metrics be used to manage a software project and the software process ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. Discuss the waterfall software development life cycle model with diagrammatic illustration. What are the waterfall model strengths? What are the waterfall model deficiencies? When to use the waterfall model?

Or

12. Discuss the following :

(a) Agile Process.

(6 marks)

(b) Extreme Programming.

(6 marks)

13. What is a software requirements specification? Present the software requirements specification template.

Or

14. What is scenario-based modeling? Discuss with an example.

15. What is software design? Explain with diagrammatic illustration the process of translating the requirements model into the design model.

Or

16. What is coupling? Explain the different types of coupling with an example.

17. (a) Why is a highly coupled module difficult to unit test? Explain with an example.

(6 marks)

- (b) Explain top-down integration testing and bottom-up integration testing with an example.

(6 marks)

Or

18. What is cyclomatic complexity? Explain with an example how to construct a flow graph for a program and compute cyclomatic complexity.

19. What is project planning? Outline the task set for project planning.

Or

20. What is risk? Discuss risk mitigation, monitoring, and management with an example.

[5 × 12 = 60 marks]

G 1955

(Pages : 3)

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B.TECH. DEGREE EXAMINATION, MAY 2018

Sixth Semester

Branch : Information Technology

IT 010 606 L04—ADVANCED DATABASE SYSTEMS—Elective—I (IT)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Why data replication is useful in a distributed database environment ?
2. Outline the difference between transient objects and persistent objects.
3. Outline the characteristics of a data warehouse.
4. What is a strong entity ? Give example.
5. Outline the difference between row-level and statement-level active rules.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. How is horizontal partitioning of a relation specified ? How can a relation be put back together from a complete horizontal partitioning ? Give example.
7. Outline the features of object query language.
8. Write a note on the client / server model.
9. Present an outline of database tuning.
10. Outline with an example rule-based reasoning.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions

Each full question carries 12 marks.

11. Consider four sites Site A, Site B, Site C and Site D in a distributed database environment. Relations are stored in the following manner:

Site A : SUPPLIER (SUPPLIER_NO, NAME, CONTACT_NUMBER)

The primary key is SUPPLIER_NO

Site B : PART (PART_NUMBER, PART_NAME, COLOR)

The primary key is PART_NUMBER. Each part has a distinct color.

Site C : SUPPLIES (SUPPLIER_NO, PART_NUMBER)

The primary key is (SUPPLIER_NO, PART_NUMBER). A supplier can supply many parts. A part can be supplied by many suppliers.

At Site D the following query is executed: Get the details of suppliers who supply 'RED' color parts.

Appraise the role played by the global query optimizer and local query optimizer in executing the above query step by step.

Or

12. (a) What is a distributed transaction ? Appraise with an example transaction management in distributed database environment. (6 marks)
- (b) Appraise with an example how concurrency control is enforced in a distributed database environment. (6 marks)
13. Appraise the necessary characteristics a system must satisfy to be considered as an object oriented database management system.

Or

14. Present an object oriented database design for a "Banking System". State the functional requirements you are considering.
15. Appraise with an example the relationship between operational data, a data warehouse and data marts.

Or

16. (a) What is handoff ? Outline with an example handoff management in mobile databases.

(8 marks)

(b) Outline effect of mobility on data management in mobile databases. (4 marks)

17. What is database normalization ? Explain with an example first normal form, second normal form and third normal form.

Or

18. Outline the features of the following databases :

(a) Temporal Databases. (6 marks)

(b) Spatial Databases. (6 marks)

19. Appraise with an example how a deductive database system can make deductions based on rules and facts stored in the database.

Or

20. Outline the features of the following databases :

(a) Multimedia Databases. (6 marks)

(b) Text Databases. (6 marks)

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2018**Sixth Semester**

Branch : Information Technology

IT 010 602—DIGITAL SIGNAL PROCESSING (IT)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. Discuss the advantages and disadvantages of digital signal processing.
2. State and prove time convolution property of DTFT.
3. Discuss the ROCs of infinite duration discrete time signals.
4. What are the various factors based on which a choice is made on the realization of a system ?
5. What is the relation between DTFT and DFT ? Discuss.

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. Check if the following signals are periodic or aperiodic :
 - (a) $x(n) = \cos(2\pi n/16)$.
 - (b) $x(n) = \cos 2n$.
7. Discuss the impulse response of interconnection of systems.
8. Write notes on sampling theorem and aliasing.
9. Obtain the direct form I and direct form II structures of the system described by

$$y(n) = y(n-1) - \frac{1}{2}(n-2) + x(n) + \frac{7}{4}x(n-1) - \frac{1}{2}x(n-2).$$

10. Compare the various windows available for the design of FIR filters.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

Check the following discrete time systems for stability, causality, time invariance and linearity :

(a) $y(n) = nx(n)$. (6 marks)

(b) $y(n) = e^{x(n)}$. (6 marks)

Or

Consider $x(n) = \{1, 1, 1, 1, 1/2, 1/2\}$. Sketch and label each of the following signals :

(a) $x(n+2)$.

(b) $x(-n-4)$.

(c) $x(2n)$.

(d) $x(n)u(-n-2)$.

(e) $x(n)\delta(n)$.

(f) Odd part of $x(n)$.

(6 × 2 = 12 marks)

Determine the response of the system described by $h(n) = 4(n-2) - u(n-8) + u(n-11) - u(n-17)$ to the input signal $x(n) = u(n) - u(n-5)$.

Or

Determine $|H(\omega)|^2$ for the system :

(a) $y(n) = -0.1y(n-1) + 0.2y(n-2) + x(n) + x(n-1)$. (6 marks)

(b) Derive the condition for an LTIS to be causal. (6 marks)

Obtain the z-transform of $x(n) = a^n \sin \omega_0 n u(n)$ by applying the properties.

Or

Obtain the discrete time signal represented by $X(z) = \frac{z^{-1} + 1/2z^{-2}}{1 - 3/5z^{-1} + 2/25z^{-2}}$, if the sequence is causal.

Determine a parallel and a cascade realization of the system

$$H(z) = \frac{1 + z^{-1}}{(1 - z^{-1})(1 - 0.8e^{j\pi/4}z^{-1})(1 - 0.8e^{-j\pi/4}z^{-1})}$$

Or

Write notes on the effect of rounding and truncation in digital filters.

Determine the 8-point DFT of $x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$ using DIF-FFT algorithm.

Or

Design a high pass filter using Hamming window with a cut-off frequency of 1.2 rad/s and $N = 9$.

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, MAY 2018**Sixth Semester**

Branch : Information Technology

IT 010 603—INFORMATION THEORY AND CODING (IT)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. Define conditional entropy.
2. What is the capacity of a channel with infinite bandwidth ?
3. Define Kraft's inequality.
4. What is encoding and decoding ?
5. What are convolutional codes ?

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. Show that $H(X, Y) = H(X/Y) + H(Y)$.
7. Explain channel capacity for symmetric channels.
8. What is encoding ? Explain the purpose of encoding.
9. Explain the error detecting and correcting capabilities of a system.
10. Explain sequential decoding.

(5 × 5 = 25 marks)

Part C*Answer all questions.**Each full question carries 12 marks.*

11. (a) A Black and white TV picture consists of 1024 line of picture information. Assume that each line consists of 1024 pixels, with each pixel having 256 equiprobable brightness levels. Pictures are repeated at the rate of $r_s = 30$ frames per second. Calculate the rate of information conveyed by a TV set to the viewer.

Turn over

(b) Define channel capacity, redundancy and efficiency of channels.

Or

12. Explain the relation between mutual entropy and conditional entropy along with necessary proof and examples.

13 (a) A BSC channel has the following noise matrix with source probabilities $P(X_1) = (2/3)$ and $P(X_2) = (1/3)$.

$$P(Y/X) = \begin{bmatrix} \frac{3}{4} & \frac{1}{4} \\ \frac{1}{4} & \frac{3}{4} \end{bmatrix}$$

Determine:

(i) $H(X)$, $H(Y)$, $H(X,Y)$, $H(Y/X)$, $H(X/Y)$ and $I(X,Y)$.

(ii) Channel capacity C .

(iii) Channel efficiency and redundancy.

(b) Explain the tradeoff between the bandwidth and signal to noise ratio.

Or

14. (a) Define and explain Shannon theorem discrete channels and Shannon-Hartley theorem continuous channels.

(b) Consider Shannon's the channel capacity theorem, for a continuous communication channel having bandwidth W Hertz, perturbed by additive white Gaussian noise of power spectral density N_0 , and average transmitted power P .

(i) Is there any limit to the capacity of such a channel if you increase its signal-to-noise ratio $P/(N_0W)$ without limit? If so, what is the limit?

(ii) Is there any limit to the capacity of such a channel if you can increase its bandwidth W in Hertz without limit, but while not changing N_0 or P ? If so, what is that limit?

15. Explain Shannon's noiseless encoding theorem.

Or

16. What is arithmetic coding? Explain with an example.

17. The parity check bits of a (8, 4) block code are generated by $C_5 = d_1 + d_2 + d_4$, $C_6 = d_1 + d_2 + d_3$, $C_7 = d_1 + d_3 + d_4$, $C_8 = d_2 + d_3 + d_4$ Where d_1, d_2, d_3 and d_4 are message bits.

(i) Find the generator matrix and parity check matrix.

(ii) Find the minimum weight of this code.

(iii) Show through an example that this code can detect and correct errors.

Or

18. With an example, explain the error detection and correction using Hamming code.

19. Explain Viterby algorithm. Mention its applications.

Or

20. Explain various types of ARQ Protocols.

(5 × 12 = 60 marks)