G 5034

(Pages : 2)

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch—Information Technology

PROJECT MANAGEMENT (T)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 marks.

1. List out the factors influencing capital formation.

2. How will you estimate the duration of completion of a project?

3. Briefly discuss how market type influences a project.

4. Write a note on cost allocation on activities in a project.

5. List out any *three* constraints on control of a project and suggest a solution for each.

6. Briefly discuss the methods of evaluation of a project.

7. Briefly discuss the criteria for benchmarking.

8. How will you evaluate reliability of a system?

9. Draw a scheme for design associated with a cluster sample.

10. List the techniques commonly used to estimate mean of a population.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 marks.

11. Discuss the various aspects of a long-term project management in a hardware industry.

Or

12. Discuss the various management activities and the hierarchy of the project organization system.

Turn over

13. Explain the parameters influencing risk related to a project. Discuss the importance of risk analysis.

Or

14. Discuss the concepts, techniques, methodologies and tools used for technical analysis.

15. Explain the various project information systems in detail.

Or

16. With examples, detail the various issues in evaluation and management of a project.

17. Differentiate between total quality management and quality control. Explain the elements of TQM, with a block diagram.

Or

18. Discuss the different quality systems. Also, elaborate on the quality expectations in information technology sector.

19. Discuss :

    (i)   Sample size destination.   (6 marks)

    (ii) Population proportion.   (6 marks)

Or

20. Explain the role of sampling on analysis and review of a project.

$[5 \times 12 = 60 \text{ marks}]$

G 5042   (Pages : 2)   Reg. No...............................

Name...................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Computer Science and Engineering/Information Technology

SOFTWARE ENGINEERING (R, T)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 marks.

1. What are the limitations of the Waterfall model?

2. Briefly explain the Spiral Model.

3. Briefly explain the intermediate COCOMO model.

4. What is a Cost-Schedule Milestone graph? Explain its use.

5. Differentiate between functional abstraction and data abstraction used in software design.

6. What do you mean by Stability Metrics of a design?

7. What do you mean by Prologue of a code module? What are the desirable contents of a Prologue?

8. Explain the process of Code Reading.

9. Explain the terms : Error, Fault and Failure.

10. What do you mean by Boundary Value Test Case? Explain.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 marks.

11. (a) Explain the goals of Planning, Monitoring and Control, and Termination Analysis phases of project management.

Or

(b) What do you mean by software metrics? How are they generally measured? Explain the need for models.

(6 + 6 = 12 marks)

Turn over

12. (a) Explain the types of the most common errors that may occur in an SRS.

    (b) Explain the different Software Requirement Validation methods in detail.

                                                                    (4 + 8 = 12 marks)

13. Explain any *four* methods for monitoring a project.

                                                                    (12 marks)

                                    Or

14. Explain the software inspection/review process in detail.

                                                                    (12 marks)

15. (a) Explain in detail, the concepts of Coupling and Cohesion with respect to function-oriented design

    (b) What is the difference between a flow chart and a structure chart?

                                                                    (8 + 4 = 12 marks)

                                    Or

16. Briefly explain the steps of Structured Design Methodology.

                                                                    (12 marks)

17. Explain in detail, the Symbolic Execution method for code verification.

                                                                    (12 marks)

                                    Or

18. (a) Explain the Static Analysis method for code verification.

    (b) What is a symbolic execution tree? Give its properties.

                                                                    (8 + 4 = 12 marks)

19. Explain and differentiate between Control Flow Based and Data Flow Based structural testing.

                                                                    (12 marks)

                                    Or

20. Explain the Mutation Testing in detail.

                                                                    (12 marks)

                                                                    [5 × 12 = 60 marks]

G 5061

(Pages : 2)

Reg. No.................................

Name...................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch—Computer Science and Engineering/Information Technology

COMPUTER NETWORKS (R, T)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions briefly.
Each question carries 4 marks.

1. Distinguish between bridges and routers.

2. Explain a protocol in the router level in the OSI model.

3. Explain the meaning of the terms : connection-oriented and connection-less modes, relating to a Data link layer protocol.

4. Explain the principle of operation of a CRC error detection method. Give an example

5. Define and explain virtual path and virtual circuit.

6. Explain the problems faced in window congestion control.

7. Explain the important features of TCP and UDP.

8. Describe statistical multiplexing of ATM.

9. Explain various components of e-mail system.

10. Explain the types of error correcting methods used by Bluetooth.

(10 × 4 = 40 marks)

Part B

Answer any one full question from each module.
Each full question carries 12 marks.

MODULE 1

11. With neat diagrams, explain the services, interfaces and protocols with respect to OSI-ISO model.

Or

12. Explain different kinds of satellites used in compute communication. Describe the features of LEO and MEO satellites.

Turn over

Module 2

13. (a) Discriminate between the send window and receive window for a link and how they are related for a Go Back N control scheme.

(7 marks)

(b) "In stop and wait protocols, frames and acknowledgements should be numbered". Justify.

(5 marks)

Or

14. Explain in detail, with example, neat sketches and necessary derivations, the following :—

(i) Framing-all types.

(ii) Aloha and slotted Aloha.

Module 3

15. What are the three phases of congestion control algorithm ? Explain them.

Or

16. (a) Discuss the principle of distance vector routing with neat diagrams.   (6 marks)

(b) Describe the dynamic alternate routing and separable routing for circuit switched networks.

(6 marks)

Module 4

17. (a) Discuss cell formats in an ATM network.   (6 marks)

(b) Explain the different service categories used in ATM networks.   (6 marks)

Or

18. (a) Explain the window adjustment process in TCP.   (6 marks)

(b) Explain the concept of IP over ATM.   (6 marks)

Module 5

19. What are the different kinds of services rendered by DNS ? Explain each one clearly.

Or

20. Draw and explain the Bluetooth protocol architecture. Explain the functions of L2CAP and in it ?

[5 × 12 = 60 marks]

G 5071

(Pages : 2)

Reg. No................................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Computer Science and Engineering/Information Technology

NETWORK COMPUTING (R, T)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. Give any tout common attributes of the <FRAMESET> tag and their purpose.

2. Explain the use of the CLASS attribute.

3. What do you mean by an ActiveX control ? Compare it with Java applets.

4. Explain how JavaScript can be used to dynamically update a web site.

5. Explain the purpose of the finalize ( ) method of Java.

6. What are static classes ? Explain their use.

7. Compare and contrast Applets and Application programs.

8. Explain the additional security features that Applets can have.

9. Explain the ways in, which a CGI program gets data from the client browser.

10. Differentiate between persistent and non-persistent HTTP.

(10 × 4 = 40 marks)

Part B

Answer any one full questions
Each full question carries 12 marks.

11. (a) Illustrate the use of external, embedded and inline CSSs with sample code for each.

(8 marks)

(b) Give the advantages and disadvantages of frames.

(4 marks)

Or

12. (a) Comment on the cascading effect of CSS.

(4 marks)

(b) Explain the usage of <SPAN> and <DIV> tags with sample code.

(8 marks)

Turn over

13. (a) Write a JavaScript program that reads five integers and displays the largest and the smallest among them.

(6 marks)

(b) Write a JavaScript program to sort an array of 10 integers. (6 marks)

Or

14. (a) Write a JavaScript program that calculates the product of the odd integers from 1 to 15 and then outputs HTML text that displays the result.

(6 marks)

(b) Explain the purpose of any *six* of the Java Script's global functions. (6 marks)

15. (a) Explain Java's inter-thread communication mechanism with the help of a sample code.

(8 marks)

(b) Explain the use of any four major methods that the Thread class defines. (4 marks)

Or

16. (a) Explain and differentiate between method overloading and method overriding with the help of code.

(8 marks)

(b) Why are destructors as in C++ not there in Java ? (4 marks)

17. Give and explain a simple TCP client program and a corresponding server program.

(12 marks)

Or

18. What is the URL Connection class of Java for? Give a sample code to illustrate the use of it.

(12 marks)

19. Explain the working of SMTP and POP protocols. (12 marks)

Or

20. (a) Explain the working of a typical CGI supported web server. (8 marks)

(b) Differentiate between GET method and POST method of HTTP. (4 marks)

[5 × 12 = 60 marks]

G 5083

Reg. No.................................

Name....................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Information Technology

PERSONAL COMPUTER HARDWARE (T)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries **4** *marks.*

1. State the merits and demerits of SMPS compared to linear power supply.

2. Describe the different types of slots used in a PC.

3. Clearly distinguish between disk formatting and partitioning.

4. What is DMA ? Where it is used ?

5. What are the uses of WORM devices ?

6. Explain the principle of holographic storage ? What are its advantages ?

7. Distinguish write-through and write-back in cache.

8. Distinguish between segmented and linear memory system.

9. Explain the working of a mouse.

10. Why serial communication is used in communicating with I/O devices ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries **12** *marks.*

MODULE 1

11. With a neat diagram, explain the components in a motherboard and their functioning ?

Or

12. Explaining the working of SMPS, show how a regulated voltage output is supplied to the PC ? Use the necessary waveforms.

MODULE 2

13. Explain the structure of a hard disk. Describe how data is stored and read from it.

Or

Turn over

14. Describe standard CHS addressing and Logical Block Addressing. Give their applications.

MODULE 3

15. Explain the constructional details of CD ROM. Indicate the memory read and write operations.

Or

16. Describe the principle of magneto-optical storage. How the data reading is done ? Compare it with the data storage on CD ROM.

MODULE 4

17. What is virtual memory ? Explain virtual to physical addresses with neat diagrams.

Or

18. (a) Explain how the translation buffers speed up logical address generation.   (6 marks)

    (b) Compare and distinguish between logical address and physical address.   (6 marks)

MODULE 5

19. Explain :

    (i) ISA bus architecture.

    (ii) IDE interface.

                                               (6 marks)

                                               (6 marks)

Or

20. Explain PCI and AGP architectures with necessary diagrams.

[5 × 12 = 60 marks]

G 5392   (Pages : 2)   Reg. No...................................

Name.....................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 601/IT 010 601—DESIGN AND ANALYSIS OF ALGORITHMS (CS, IT)

(New Scheme—Regular)

Time : Three Hours   Maximum : 100 Marks

*Answer **all** the questions.*

Part A

Each question carries 3 marks.

1. What is an algorithm ? Mention its properties.

2. Is there any advantage for Strassen's matrix multiplication over ordinary matrix multiplication. Justify your answer.

3. Explain the greedy strategy.

4. What do you mean by bounding function ?

5. Describe briefly planar graph colouring.

(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. What is an Asymptotic Notation ? Explain how complexity analysis is done with each of them.

7. Explain the binary search algorithm.

8. State and explain 0 –1 knapsack problem

9. Write notes on back tracking.

10. Explain complexity of Kth element selection.

(5 × 5 = 25 marks)

Part C

Each question carries 12 marks.

11. (a) Solve the following recurrences using Iteration method :

$$T(n) = 2T(\lfloor n \mid 3 \rfloor) + n.$$

(b) Solve $T(n) = 3T(n \mid 4) + n$ using recursion tree.

(6 + 6 = 12 marks)

Or

Turn over

12. Explain Amortised analysis and analyse its complexity.   (12 marks)

13. Explain quick sort and analyse its complexity.   (12 marks)

Or

14. Explain strassen's matrix multiplication.   (12 marks)

15. Explain Prim's algorithm and analyse its complexity with an example.   (12 marks)

Or

16. What is dynamic programming ? Explain travelling sales man problem and analyse the complexity.

                                                                               (12 marks)

17. Explain N Queens problem. Also describe how to solve it and analyse complexity.   (12 marks)

Or

18. Explain how sum subset problem is solved and analyse in complexity.   (12 marks)

19. What is string matching ? Explain Rabin-Karp algorithm for string matching.   (12 marks)

Or

20. (a) Explain searching and sorting with the help of comparison trees.   (8 marks)

     (b) Explain randomised and Las vegas algorithm.   (4 marks)

                                                                               [5 × 12 = 60 marks]

G 5403

(Pages : 2)

Reg. No...................................

Name..

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Information Technology

IT 010 602—DIGITAL SIGNAL PROCESSING (IT)

(New Scheme—Regular)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. What is meant by a causal system ?

2. Explain the convolution theorem.

3. Mention the significance of ROC for Z-transform.

4. List the different methods for FIR filter design.

5. Which property helps in reducing computational complexity in FFT ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Brief some applications of DSP.

7. What is the importance of impulse response of a system ?

8. Compute convolution $x(n)$ of signals $x_1(n) = \{4, -2, 1\}$, $x_2(n) = \{1, 0 \leq n \leq 5 \ \& \ 0 \text{ otherwise}\}$. Using Z-transform.

9. Draw the direct form structure for realising FIR system.

10. Define DTFT.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each question carries 12 marks.

11. Find the properties of digital systems :

    (i) time invariance ; (ii) stability ; and (iii) linearity.

    (a) $y(n) = \cosh[n + x(n-1)]$.

    (b) $y(n) = x[-n-2]$.

    Or

Turn over

12. Check whether the following systems are linear and time invariant :

(a) $Fx(n) = n[x(n)]^2$.

(b) $Fx(n) = a[x(n)]^2 + bx(n)$.

13. Determine the impulse response for the system defined by difference equation

$$y(n) - x(n) + 3x(n-1) - 4x(n-2).$$

Or

14. A digital filter is characterized by the difference equation

$$y(n) = x(n) + e^x y(n-1)$$

Check for its stability.

15. Determine the impulse response for the system given by difference equation

$$y(n) = x(n) + 3x(n-1) - 2x(n-2)$$ using Z-transform.

Or

16. Explain the properties of Z-transform.

(12 marks)

17. Realise the following FIR system function

$$H(z) = \frac{2}{3} + z^{-1} + \frac{2}{3}\, z^{-2}.$$

Or

18. Draw the structure of cascade realisation of system characterized by TF

$$H(z) = 2 + (z+2)$$

$$z(z-0.1)(z+0.5)(z+0.4).$$

(12 marks)

19. Explain the different window functions used in the design of FIR filters.   (12 marks)

Or

20. Compute DFTs of the sequence $x(n) = \cos \dfrac{n\pi}{2}$ where N = 4 using DIF FFT algorithm.

(12 marks)

[5 × 12 = 60 marks]

G 5425 (Pages : 2) Reg. No...............................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Information Technology

IT 010 604—SOFTWARE ENGINEERING (IT)

(New Scheme—Regular)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Define Software.

2. Define Elicitation.

3. Explain Design Process.

4. What do you mean by Testing ?

5. Explain "The Product" in the context of The Management Spectrum.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Draw the diagram of a software framework.

7. Describe Scenario-Based modelling.

8. Explain Abstraction.

9. Explain Verification and Validation.

10. Explain Risk Management.

(5 × 5 = 25 marks)

Part C

Answer any one question from each module.
Each question carries 12 marks.

11. With a block diagram explain the phase of Unified Process.

Or

12. With a Block diagram explain the Agile Process.

Turn over

13. Draw block diagrams and explain Flow Oriented modelling.

                              Or

14. Explain (i) UML models ; (ii) Behavioural model.

15. Explain any *two* elements of "The Design Model".

                              Or

16. Explain :

    (i)   Architectural Mapping.

    (ii) Component-level design.

17. Explain Test Strategies for Conventional software.

                              Or

18. Explain : (i) Model-based Testing ; (ii) Software Reliability.

19. Write notes on : (i) Project Scheduling ; (ii) Software measurement.

                              Or

20. Explain Decomposition techniques.

                                        (5 × 12 = 60 marks)

G 5436

Reg. No..............................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Information Technology

IT 010 601 – COMPUTER NETWORKS (IT)

(New Scheme – Regular)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What are Hubs?

2. What is a virtual circuit?

3. Explain slotted ALOHA.

4. What is UDP?

5. What is MIME?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Compare LEO and MEO satellites.

7. Explain Sliding window protocol.

8. Explain Distance Vector Routing.

9. Explain the functions of ATM network.

10. Discuss the operation of DNS.

(5 × 5 = 25 marks)

Part C

Answer any **one** *full question from each module.*

Each question carries 12 marks.

11. Compare ISO-OSI reference model and TCP/IP reference model.

(12 marks)

Or

Turn over

12. Explain briefly :

    (a) Repeaters.   (b) Routers.

    (c) Bridges.   (d) Gateways.

$(3 \times 4 = 12$ marks)

13. (a) Explain the design issues in Data Link Layer.

    (b) Explain Error detection and Error correction in Data Link Layer.

$(6 + 6 = 12$ marks)

Or

14. Explain CSMA with collision detection in detail.

(12 marks)

15. Discuss the Congestion control algorithms.

(12 marks)

Or

16. Explain :

    (a) Jitter control.

    (b) Link State Routing.

$(6 + 6 = 12$ marks)

17. Explain the Transport service primitives.

(12 marks)

Or

18. (a) Compare TCP and UDP in detail.

    (b) List the characteristics of an ATM network.

$(6 + 6 = 12$ marks)

19. (a) Explain Bluetooth.

    (b) Briefly describe the communication in Bluetooth networks.

$(6 + 6 = 12$ marks)

Or

20. Discuss the general model of an Electronic Mail System.

(12 marks)

$[5 \times 12 = 60$ marks]

G 5453

(Pages : 2)

Reg. No.................................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 606 L04/IT 010 606 L03—UNIX SHELL PROGRAMMING (Elective I) (CS, IT)

(New Scheme—Regular)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Explain file handling utilities.

2. What is a tee command ?

3. With examples show the usage of grep commands.

4. List the features of BASH-Shell.

5. What is dns ? Explain.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Draw and explain the architecture of UNIX.

7. Explain the steps for the concatenation of files.

8. With examples explain different string functions.

9. Explain eval commend with an example.

10. Explain the architecture of X-window.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each question carries 12 marks.

11. With examples explain some Basic UNIX commands.

Or

12. Describe the text processing utilities and back-up.

Turn over

13. With examples, explain the concept of pipe and pipe operator with respect to C shell.

Or

14. Explain the steps, with examples the concatenation and comparing of files.

15. With examples explain Associative Arrays and some mathematical functions explanation and usage.

Or

16. Write system commands in awk and explain how it will be executed with examples.

17. What are environmental variables? Explain. Give a brief description of the exit status of a command.

Or

18. Explain argument validation and changing positional parameter in detail. Show examples.

19. Discuss with examples the client server mechanism and address resolution.

Or

20. With proper examples describe the window system.

(5 × 12 = 60 marks)

G 5051 (Pages : 3) Reg. No..........................

Name...............................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch—Electronics and Communication Engineering/Information Technology/
Applied Electronics and Instrumentation/Electronics and Instrumentation

DIGITAL SIGNAL PROCESSING (LTAS)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 marks.

1. Obtain the system function of normalised Butterworth filter of order 2.

2. Find the cascade form realisation of the system function $H(z) = 1 + \dfrac{5}{2}z^{-1} + 2z^{-2} + 2z^{-3}$.

3. Prove the inherent stability property of FIR filters.

4. What is Window? Classify the different types of window functions.

5. Explain, with an example, the computational benefit achieved when DFT is obtained using FFT algorithm, compared to usual method.

6. Compute the circular convolution of the sequences :

   $x_1(n) = (1, 1, 1)$ and $x_2(n) = (1, -2, 2)$.

7. Describe finite word length effects in digital filters.

8. With an example, illustrate how the limit cycle oscillations due to overflow can be prevented?

9. Explain the model of speech production.

10. State the homomorphic significance process of speech.

                                                                    (10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 marks.

Module 1

11. A discrete time system is expressed as

$$H(z) = \dfrac{10\left(1 - \dfrac{1}{2}z^{-1}\right)\left(1 - \dfrac{2}{3}z^{-1}\right)\left(1 + 2z^{-1}\right)}{\left(1 - \dfrac{3}{4}z^{-1}\right)\left(1 - \dfrac{1}{8}z^{-1}\right)\left(1 - \left(\dfrac{1}{2} + j\dfrac{1}{2}\right)z^{-1}\right)\left(1 - \left(\dfrac{1}{2} - j\dfrac{1}{2}\right)z^{-1}\right)}.$$

Turn over

Find the difference equation for the system. Realise the system in direct form II and also in parallel form using second order sections.

Or

12. Design a Digital Butterworth low pass filter using impulse invariant transformation for the following specifications :

$$0.8 \leq H\ (e^{jw}) \leq 1;\ \text{for}\ 0 \leq w \leq 0.2\pi$$

$$|H\ (e^{jw})| \leq 0.2\ ;\ \text{for}\ 0.6\ \pi \leq w \leq \pi.$$

MODULE 2

13. Design a band pass linear phase FIR filter having cut-off frequencies of $w_c = 1$ rad/sample and $w_c = 2$ rad/sample. Obtain the unit sample response using the window

$$w\ (n) = \begin{cases} 1 & \text{for}\ 0 \leq n \leq 6 \\ 0 & \text{otherwise.} \end{cases}$$

Or

14. Design a FIR low pass filter using rectangular window using pass band gain of 0 dB, cut-off frequency of 200 Hz, sampling frequency of 1 kHz. Assume length of impulse response as 7.

MODULE 3

15. (a) State and prove periodicity property of DFT.

(6 marks)

(b) The impulse response of a system is given as $[\underset{\uparrow}{3}, 2]$. Find the output of the system, for an input [0, 1, 0, 1] using circular convolution.

(6 marks)

Or

16. Compute linear convolution of two sequences given below using DIT-FFT algorithm $x_1(n) = (1,2, 3, 4)$ and $x_n(n) = (2, 1, 2, 1)$.

MODULE 4

17. Explain fixed point arithmetic. What is the limitation of this representation ? Explain how it is overcome in floating point arithmetic. Discuss the merits and demerits of the two schemes. Give examples of practical applications of the two.

Or

18. (a) Explain the different finite word length effects that degrade the performance of FIR filters.

(6 marks)

(b) Describe the various quantization errors in digital filters.

(6 marks)

MODULE 5

19. Explain techniques of processing of radar signals. Discuss the applications of DSP in radar.

Or

20. (a) With a suitable block diagram, explain a channel vocoder.

(6 marks)

(b) What are the applications of DSP in speech analysis and synthesis?

(6 marks)

[5 × 12 = 60 marks]

G 5413　　　　　　　　　(Pages : 3)　　　　　　Reg. No..............................

　　　　　　　　　　　　　　　　　　　　　　　　Name..............................

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Information Technology

IT 010 603—INFORMATION THEORY AND CODING (IT)

(New Scheme—Regular)

Time : Three Hours　　　　　　　　　　　　　　　　　　Maximum : 100 Marks

Answer all *questions.*

Part A

Each question carries 3 marks.

1. Define Entropy. List its properties.

2. Sketch the channel transition matrix of a binary symmetric channel and give the expression of entropy and channel capacity of it.

3. Describe the need of source coding.

4. Discuss the error detection and correction capabilities of (m, k) linear block codes.

5. Define code rate, constraint length and coding efficiency of a convolution code.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. Define self information and mutual information. Differentiate between it.

7. State and explain Shannon's channel coding theorem.

8. State and prove Kraft's inequality.

9. What is a systematic code ? Give the structure of the G and H matrices of a systematic (n, k) linear block code.

10. Explain with sketches, bit and block interleavers.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　(5 × 5 = 25 marks)

Part C

Each question carries 12 marks.

11. State and prove properties of mutual information.

Or

Turn over

12. A binary channel has the following characteristics

$$\begin{array}{cc} & \begin{array}{cc} 0 & 1 \end{array} \\ \begin{array}{c} 0 \\ 1 \end{array} & \begin{bmatrix} 2/3 & 1/3 \\ 1/3 & 2/3 \end{bmatrix} \end{array}.$$

(a) If the input symbols are transmitted with probabilities $3/4$ and $1/4$ respectively, find

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

(b) Find the channel capacity, efficiency and redundancy of the channel.

(c) What are the source probabilities that corresponds to the channel capacity ?

13. Consider a cascade of two channels with input X to the first channel and output Y of it is fed as the input of the second channel. If z is the output of channel two, show that

$I, (X,Y) = H(X) - H(X/Y)$

$I(X, Z) = (H(X) - H(X/Z))$

and $I(X, Z) \le I(X,Y)$

Or

14. (a) Derive the relation of the capacity of a channel with infinite bandwidth.

(b) An analog signal has 4kHz bandwidth. The signal is sampled at 2.5 times the Nyquist rate and each sample is quantized into 256 equally likely levels. Assume that the successive samples are statistically independent. Then

(i) find the information rate of this source.

(ii) can the output of this source be transmitted without errors over a Gaussian channel of bandwidth 50 kHz and S/N ratio of 20 dB ?

(iii) if the output of this source is to be transmitted without errors over an analog channel having S/N ratio 10 dB, compute the bandwidth requirement of the channel.

15. (i) Using Shannon-Fano encoding scheme, encode a binary source which emits alphabets

$s_1, s_2, s_3, s_4, s_5, s_6$ with corresponding probabilities $\frac{1}{3}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{1}{12}$ and $\frac{1}{12}$.

(ii) Construct a binnary code of the above problem and determine the efficiency and redundancy in each case.

Or

16. (a) List the steps in arithmetic coding.

(b) In a text, it is found that the probability of occurrence of symbols {a, b, c} are {0. 4, 0. 5, 0. 1}. Use arithmetic coding to code the string 'bbbc'.

'17. (a) List the main characteristics of RS and BCH codes.

(b) Consider a (7, 4) linear block code whose generator matrix is given below

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 & 1 \end{bmatrix}$$

(i) Find all codewords of this code.

(ii) Find H matrix of this code.

(iii) Draw the encoder diagram.

Or

18. (a) Given the generator polynomial $g(X) = 1 + X^2 + X^3$ of a (7, 4) cyclic code.

(i) Generate systematic and non-systematic code vectors for the message vector 1011.

(ii) Sketch the encoder and syndrome calculator.

(iii) Obtain the syndrome for the received code word 1001011.

(b) Explain the burst error correcting capabilities of cyclic codes.

19. (i) Sketch a convolution encoder with $k = 1$, $n = 2$ and constraint length 3.

Given the generator vectors are 111 and 101.

(ii) Obtain the output for the input sequence 10011, using time domain approach.

(iii) Sketch the code tree and state diagram for the above encoder.

Or

20. (a) Describe the following decoding methods used to decode the convolution codes.

(i) Viterbidecoding.

(ii) ML decoding.

(b) Write a short notes on re-transmission strategies.

(5 × 12 = 60 marks)