19. (a) A bank has two tellers working on savings accounts. The first teller handles withdrawals only. The second teller handles deposits only. It has been found that the service time distributions for both deposits and withdrawals are exponential with mean service time 3 minutes per customer. Depositors are found to arrive in a Poisson fashion throughout the day with mean arrival rate of 16 per hour. Withdrawers also arrive in a Poisson fashion with arrival rate 14 per hour. (i) What would be the effect of the average waiting time for the customers if each teller could handle both withdrawals and deposits. (ii) What would be the effect, if this could only be accomplished by increasing the service time to 3.5 minutes ?

(7 marks)

(b) In a super market, the average arrival rate of a customer is 10 in every 30 minutes following a Poisson process. The average time taken by the Manager to list and calculate the Purchase is 2.5 minutes, which is exponentially distributed.

(i) What is the Probability that the queue length exceeds 6 ?

(ii) What is the expected time spent by a customer in the system ?

(5 marks)

Or

20. (a) Customers arrive at a watch repair shop according to a Poisson process at a rate of one hour 10 minutes and the service time is an exponential random variable with mean 8 minutes. Find the average number of customers, the average waiting time a customer spends in the shop Ws, and the average time a customer spends in the Waiting for service Wq.

(6 marks)

(b) Patients arrive at a clinic according to Poisson Distribution at a rate of 30 patients per hour. The waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour.

(i) Find the effective arrival rate at the clinic.

(ii) What is the Probability that an arriving patient will not wait ?

(iii) What is the expected waiting time until a patient is discharged from the clinic ?

(6 marks)

[5 × 12 = 60 marks]

F 4863 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science Engineering / Information Technology

EN 010 501 B—ENGINEERING MATHEMATICS—IV (CS, IT)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Evaluate $\Delta\left(e^{2x}\log 3x\right)$.

2. Find the Z-transform of $(n+1)^2$.

3. Let a and b be two numeric functions such that $a_r = r+1$ and $b_r = \alpha^r$ for all $r \geq 0$. Determine $\Delta(ab)$.

4. Find the value of the integral $\int_0^{1+i}\left(x - y + ix^2\right)dz$ along the straight line from $z = 0$ to $z = 1+i$.

5. Prove by Little's formula $E(W_s) = \frac{1}{\lambda}E(N_s)$.

(5 × 3 = 15 marks)

Part B

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

6. Express $y = 2x^3 - 3x^2 + 3x - 10$ in terms of fractional polynomials and hence show that $\Delta^3 y = 12$.

7. Find the Z-transform of $na^n \sin n\theta$.

8. Determine the particular solution of the difference equation $a_r + a_{r-1} = 3r2^r$.

9. Evaluate the following integral using Cauchy's integral formula $\int_C \frac{4-3z}{z(z-1)(z-2)}dz$, where C is the circle $|z| = \frac{3}{2}$.

10. Find (i) The average number L_s of customers in the system by $(M|M|1):(\infty|FIFO)$ model.
(ii) The average number L_q of customers in the queue.

(5 × 5 = 25 marks)

Part C

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

11. (a) Use Newton's divided difference formula to find $f(x)$ from the following data :

x :	0	1	2	4	5	6
$f(x)$:	1	14	15	5	6	19

(6 marks)

(b) Express $y = x^4 - 12x^3 + 24x^2 - 30x + 9$ and its successive differences in factorial notation. Hence show that $\Delta^5 y = 0$.

(6 marks)

Or

12. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule (ii) Simpson's $\frac{1}{3}$ rule (iii) Simpson's $\frac{3}{8}$ rule.

(6 marks)

(b) Using Newton's forward formula, find the value of $f(1.6)$, if :

x :	1	1.4	1.8	2.2
y :	3.49	4.82	5.96	6.5

(6 marks)

13. (a) Find $Z^{-1}\left(\frac{z^2}{(z+2)(z^2+4)}\right)$ by the method of residues. (6 marks)

(b) Solve $6y_{n+2} - y_{n-1} - y_n = 0$ with $y(0) = 0, y(1) = 1$. (6 marks)

Or

14. (a) Find $Z^{-1}\left(\frac{z}{z^2+2z+4}\right)$ by the method of residues. (6 marks)

(b) Solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$. (6 marks)

15. (a) Show that the generating function for a, where $a_r = \binom{2r}{r}$ is $(1-4z)^{-1/2}$. (6 marks)

(b) Solve the recurrence relation $a_r + 6a_{r-1} + 9a_{r-2} = 3$, given that $a_0 = 0$ and $a_1 = 1$. (6 marks)

Or

16. (a) Determine the discrete numeric function corresponding to the generating function $A(z) = \frac{1}{(1-z)(1-z^2)(1-z^3)}$. (6 marks)

(b) Find the particular solution of the difference equation $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2 - 2r + 1$. (6 marks)

17. (a) Find all possible Taylor's and Laurent's series expansions of the function $\frac{1}{(z+1)(z+2)^2}$ about the point $z = 1$. (7 marks)

(b) Evaluate the residues at the poles of the function $f(z) = \frac{z^2-2z}{(z+1)^2(z^2+4)}$. (5 marks)

Or

18. (a) Show that the function $z\,|z|$ is not analytic anywhere. (3 marks)

(b) Evaluate by contour integration, $\int_0^\infty \frac{dx}{x^6+1}$. (9 marks)

Turn over

F 4880 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science and Engineering / Information Technology

CS 010 503/IT 010 506 – DATABASE MANAGEMENT SYSTEMS (CS, IT)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Differentiate between participation and cardinality constraint.
2. Explain referential integrity in SQL.
3. Explain the need of indexing in database systems.
4. Define a prime attribute.
5. What are the ACID properties of transactions?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain :
   (a) Data Model.
   (b) Metadata.
   (c) Key attribute.
   (d) Subordinate entity.
   (e) Database Schema.
7. Write notes on correlated queries with an example.
8. Why is it preferable to use a dense index rather than a sparse index?
9. Explain Armstrong's axioms of functional dependency. Why they are called sound and complete?
10. Explain the wait-for-graph used for deadlock detection.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (a) Explain the database system structure with a neat diagram.

Or

(b) (i) Explain:

1. Recursive Relationships.
2. Specialization.

(ii) Develop an ER diagram for an employee database.

(6 + 6 = 12 marks)

12. (a) What is a join operation? Explain the different types of join operations in relational algebra.

Or

(b) What are the properties of a relational database? Explain the different constraints on relational database tables.

13. (a) Explain the storage organization in oracle with a neat diagram.

Or

(b) Write notes on : (i) Triggers ; (2) Assertions.

14. (a) Briefly explain the database design process with a neat diagram.

Or

(b) (i) Differentiate 3NF and BCNF with example.

(ii) How is BCNF more stricter than 3NF?

(8 + 4 = 12 marks)

15. (a) (i) What are conflict serializable schedules? Explain with examples.

(ii) Explain the two-phase locking protocol.

(8 + 4 = 12 marks)

Or

(b) (i) Explain timestamp-based protocols for concurrency control.

(ii) What are the different types of distributed databases?

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

F 4922 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science and Engineering

CS 010 506 – ADVANCED MICROPROCESSORS AND PERIPHERALS (CS)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the pin configuration of 8086 in maximum mode.
2. Draw and discuss the flag registers of 80286.
3. Write a note on SATA.
4. Enumerate the features of magneto-optical drives over optical drives.
5. What is the need for ECC in data transfer?

(5 × 3 = 15 marks)

Part B

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

6. Write a note on flag manipulation operations in 8086.
7. Discuss the register organisation in 80286.
8. Write a note on AGP.
9. Write a note on logical block addressing.
10. Brief on expanded memory.

(5 × 5 = 25 marks)

Part C

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

11. Explain the different addressing modes in 8086 with suitable examples.

Or

12. Write an ALP to round a number to the nearest higher even number or nearest lower odd number if it is greater than or less than the average of the numbers in an array, respectively.

Turn over

13. Explain the different addressing modes supported by 80286.

Or

14. (i) Explain branch prediction and its advantages. Explain the use of branch target buffer in branch prediction.

(ii) Write a note on Intel MMX instructions.

15. (i) What are the features of USB 3.0 compared to USB 2.0?

(ii) Discuss the need for SMPS. How does it power the different blocks of a computer?

Or

16. (i) Discuss the different hard disk interfaces in a micro-computer. Compare their performances.

(ii) Write a note on AGP.

17. (i) Write a note on disk partitioning.

(ii) Write a note on any *two* magneto-optical storage devices.

Or

18. (i) Write a note on CHS addressing.

(ii) Write a note on magnetic recording used in hard disks.

19. Explain DDR SDRAM technology.

Or

20. (i) Write a note on flash memories.

(ii) Write a note on Rambus DRAM.

(5 × 12 = 60 marks)

F 4849 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science and Engineering/Information Technology

LANGUAGE PROCESSORS (R, T)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are macros ? Explain its usage.
2. Bring out the necessity of a two-pass assembler.
3. Explain the notations used for writing a context free grammar with an example.
4. Explain the shift and reduce actions in a shift reduce parser.
5. Compare static and dynamic storage allocation.
6. Explain how compilation of expressions are done with proper example.
7. How elimination of common sub-expressions are done during optimization transformations ?
8. What is dead code ? How it is eliminated ?
9. What are the functions of an absolute loader ?
10. What is a linker ? Explain.

(10 × 4 = 40 marks)

Part B

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

11. Explain design of a two-pass assembler.

Or

12. Write briefly on macro pre-processors and macro assemblers.

13. Discuss in detail different phases of a compiler.

Or

14. Briefly explain recursive decent parser and shift reduce parser.

Turn over

15. With figures, explain storage allocation and access in block structured programming languages.

Or

16. Discuss briefly on intermediate code forms for expressions and major task of code generators.

17. With examples, explain local optimization and global optimization.

Or

18. Briefly explain the types of compiler writing tools.

19. Explain various loading schemes with examples.

Or

20. How are overlays constructed ? Explain how it is useful in reducing the memory requirement for an executable program.

(5 × 12 = 60 marks)

F 4909

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 505/IT 010 504 – OPERATING SYSTEMS (CS, IT)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What is a system call? Explain.
2. What is PCB? Explain.
3. Explain the functions of Monitors.
4. What is thrashing? Explain.
5. What is a file? Explain file concepts.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Describe the characteristics of Time Sharing Systems.
7. Draw process state transition diagram and describe the functions of each state.
8. Explain the conditions of dead lock.
9. Explain, why swapping is necessary in memory management.
10. Discuss on directory structure.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Discuss operating system structure and operations in detail.

Or

12. Explain operating system services and layered approaches of system structure in detail.

Turn over

13. What is threading? Explain briefly explain multithreading with its Benefits.

Or

14. Bring out the scheduling criteria of process scheduling. Also explain multiple-processor scheduling.

15. Give Peterson's solution for critical-section problem.

Or

16. Explain the methods for handling deadlocks. Also explain, how recovery from deadlock is carried out.

17. Discuss the basic of paging and describe in detail on multilevel paging.

Or

18. Explain the concept of virtual memory and discuss on demand paging.

19. What are the different techniques of Accessing files.

Or

20. Discuss with example any *two* disk scheduling algorithms.

(5 × 12 = 60 marks)

F 4894 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Branch : Computer Science and Engineering

CS 010 504—DIGITAL SIGNAL PROCESSING (CS)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define discrete-time Fourier transform pair for a discrete sequence.
2. Define and Draw the basic butterfly diagram of radix-2 FFT.
3. State the expression for Hamming window.
4. Enumerate the significant differences between FIR and IIR filters.
5. What are the features of TMS 320C54 DSP processor ?

(5 × 3 = 15 marks)

Part B

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

6. Explain the properties of DTFT?
7. Write down the relationship between DFT, DTFT and Z-transform.
8. Write down the expression of hamming window. Explain it.
9. Explain cascade realization.
10. Explain briefly about weather forecasting.

(5 × 5 = 25 marks)

Part C

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

11. Define Z-transform. Explain the properties of Z-transform.

Or

12. Find the impulse response of the discrete time system described by the difference equation :

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

Turn over

13. Compute an 8 point DFT using DIF FFT radix 2 algorithm X (n) = {1, 1, 1, 1, 1, 1, 1, 1}.

Or

14. Explain finite word length effects in FIR filter design.

15. A band pass filter of length 7 is required. It is to have lower and upper cutoff frequencies of 3 KHz and 6 KHz respectively. The sampling frequency is 20KHz. Determine the filter coefficients using Hanning window. Assume the filter to be causal.

Or

16. Design a filter with :

$$H_d\left(e^{-j3w}\right) = e^{-j3w} \text{ for } -\frac{\pi}{4} \leq w \leq \frac{\pi}{4}$$

$$= 0 \quad \text{for } \frac{\pi}{4} \leq w \leq \pi.$$

Using a Hanning Window with N = 7.

17. Discuss in detail about Chebyshev approximations.

Or

18. Design a second order digital low pass Butterworth filter with a cut-off frequency of 8 KHz using bilinear transformation.

19. Explain speech processing and recognition in detail.

Or

20. Explain the addressing modes and Internal Memory Organization of TMS320C54.

(5 × 12 = 60 marks)