TEST SERIES UGC-NET/JRF Jan. 2017

BOOKLET SERIES D

Paper Code 87

Test Type: TEST SERIES

Paper I & II

COMPUTER SCIENCE & APPLICATIONS

Duration: 02:30 Hours

Date: 08-01-2017

Maximum Marks: 200

Read the following instructions carefully:

1. **Paper-I** consists of 60 questions, out of 60 questions, 50 questions needs to be answered.
2. **Paper-II: 50 Q.** Each question carry **2(Two)** Marks.
3. There will be no negative marking.
4. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.
5. For rough work, blank sheet is attached at the end of test booklet.
6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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PAPER-I

1. "Sambad Kaumudi" was started by
(a) Surendra Nath Bannerjee (b) Raja Ram Mohan Roy
(c) Gangadhar Bhattacharjee (d) Bhawani Charan Bannerjee

2. Vernacular Press Act was passed by British Government in
(a) 1878 (b) 1880 (c) 1862 (d) None of these

3. Full form of SITE is
(a) Satellite Instructional Television Entertainment
(b) Satellite Instrumental Television Entertainment
(c) Satellite Instructional Television Experiment
(d) Satellite Instrumental Television Experiment

4. As per Newman and Summer Communication is the Exchange of
(a) Facts (b) Opinion (c) Emotions (d) All of the above

5. Meta-communication relates to the speaker's:
(a) unintentional choice of both words and dress (b) intentional choice of dress
(c) unintentional choice of words (d) intentional choice of words

6. ____ is not one of the 7 C's of communication:
(a) clarity (b) conciseness (c) correctness (d) character

7. Wildlife Week is celebrated on
(a) 2nd October to 8th October (b) 15th October to 2 1st October
(c) 1st June to 7th June (d) 15th June to 21st June

8. Mushroom is an example of
(a) Producer (b) Primary Consumer
(c) Secondary Consumer (d) Detritivore

9. Winter smog is formed mainly due to
(a) NO_x (b) SO_2 (c) Surface Ozone (d) PAN

10. 47^{th} Tiger Reserve of India is
(a) Pench (Maharashtra) (b) Raja Ji (Uttarakhand)
(c) Bor (Maharashtra) (d) Gundy (Tamilnadu)

11. Which of the following statement is true?
(i) Biodiversity is high in isolated islands
(ii) Biodiversity is low in tropical forests and coral reefs.
(iii) Biodiversity is higher in Europe compared to south Asia.
(a) i and ii (b) i and iii (c) i, ii and iii (d) None of these

12. Which of the following are not included in Kyoto Protocol?
i. Nitrous oxide (N_2O);
ii. Hydrofluorocarbons (HFCs);
iii. Perfluorocarbons (PFCs); and
iv. Sulphur hexafluoride (SF_6)
(a) i and ii (b) i and iii (c) i, ii and iii (d) All of these

13. In any discipline, theories and observations (related experiment results):
(a) Should complement each other
(b) more often than not should contradict each other
(c) Need not have anything to do with each other
(d) should compensate each other

14. If I do not get a satisfactory explanation to certain occurrences.
(a) It may not be worth knowing at all
(b) It would be better to wait for a person who can explain it
(c) It would be better to visit a nearby research institute to get more information
(d) I would not be at rest till I get a correct explanation

15. All are example of qualitative variables except
(a) Sex (b) Religion and castes
(c) Observation (d) Interest of the subject

16. If the sample drawn does not specify any condition about the parameter of the population, it is called
(a) Selected statistics (b) Distribution free statistics
(c) Census (d) None of the above

17. Attributes of objects, events of things which can be measured are called
(a) Data (b) Qualitative measure
(c) Variables (d) None of the above

18. In order to augment the accuracy of the study a researcher
(a) Should be honest and unbiased (b) Should increase the size of the sample
(c) Should kept the variance high (d) all of these

19. The problem of drop-out in which students leave their schooling in early years can be tackled in a better way through—
(a) Reduction of the weight of curriculum (b) Sympathy of teachers
(c) Attractive environment of the school (d) Encouragement of the students

20. The ideal teacher—
(a) Teaches the whole curriculum (b) Helps his students in learning
(c) Is a friend, philosopher and guide (d) Maintains good discipline

21. The aim of education should be—
(a) To develop vocational skills in the students
(b) To develop social awareness in the students
(c) To prepare the students for examination
(d) To prepare the students for practical life

22. The best method of checking student's homework is—
(a) To assign it to intelligent students of the class
(b) To check the answers in the class in group manner
(c) To check them with the help of specimen answer
(d) To check by the teacher himself in a regular way

23. A time bound testing programme for a students should be implemented in Schools so that—
(a) The progress of the students should be informed to their parents
(b) A regular practice can be carried out
(c) The students can be trained for final examinations
(d) The remedial programme can be adopted on the basis of the feedback from the results

24. The essential element of the syllabus for the children remained out of school should be—
(a) Literacy competencies (b) Life-skills
(c) Numerical competencies (d) Vocational competencies

25. Abortion is murder plain and simple, and anyone who doesn't believe it is just ignorant," is an example of a/an
(a) argument. (b) explanation.
(c) unsupported statement of belief or opinion. (d) illustration.

26. Which of the following is not true of a valid deductive argument?
(a) If the premises are true, then the conclusion must be true.
(b) The truth of the premises guarantee the truth of the conclusion.
(c) If the premises are false, then the conclusion must be false.
(d) It is logically inconsistent to assert all the premises as true and deny the conclusion.

27. Identify the possibly manipulative emotive word in the following description: The PM made several thoughtful recommendations to the House Budget Committee.
(a) recommendations (b) several
(c) thoughtful (d) House Budget Committee

28. All truth is relative. Now if you're saying that you can prove that there is any proposition which is absolutely true, then I'm here to tell you you're wrong.
(a) Inconsistency (b) Slippery Slope (c) Weak Analogy (d) Hasty Generalization

Directions : *In the following two question given below has a problem and two statements numbered I and II giving certain information. You have to decide if the information given in the statements is sufficient for answering the problem. Indicate your answer as*
(a) if the data in statement I alone are sufficient to answer the question;
(b) if the data in statement II alone are sufficient to answer the question;
(c) if the data even in both the statements together are not sufficient to answer the question; and
(d) if the data in both the statements I and II are needed to answer the question.

29. When will the prices of the air coolers be the lowest?
I. From July till January end companies offer 15 percent off-season discount.
II. During November, the prices will be 20 percent less than off-season prices and 30 percent less than February to June prices.

30. A ground plus four story residential building has 3 wings namely A, B and C. How many flats are there in the building?
I. Each floor has equal number of flats.
II. All the three flats on the ground floor of wing A are unoccupied.

31. DDT is related to Abbreviation in the same way as LASER is related to..... ?
(a) Antithesis (b) Acronym (c) Epigram (d) Epithet

32. Find the odd one out
(a) Lion (b) Tiger (c) Panther (d) Fox

33. An unbiased coin is tossed for 6 times. What is the chance of getting at-least 1 head?
(a) 1/32 (b) 1/64 (c) 63/64 (d) 31/32

34. Find the next number in the series
5, 12, 39, 160, ?
(a) 645 (b) 815 (c) 805 (d) 795

35. If 4th March 2006 was Saturday what will be the day on 4th march 2045?
(a) Sunday (b) Monday (c) Friday (d) Saturday

36. Two cars of length 4 m and 3 m are moving towards each other. If their speeds is 3m/s and 4 m/s respectively, in how much time they will cross each other?
(a) 2 sec (b) 1.5 sec (c) 1 sec (d) cannot be determined.

Directions (37-41): *Study the following table carefully and answer the question given below it.*
Various Food-grains sold by various farmers at various prices. (Price Per Kg.)

	Food grains				
	Rice	Corn	Bajra	Paddy	Jowar
Farmers					
A	30	22.5	22	24	18
B	36	28	24.5	25	24
C	40	24	21	26	20.5
D	34.5	27.5	28	25	25
E	36	32	30	28.5	27

37. If farmer A sells 350 kgs. of Rice, 150 kgs of Corn and 250 kgs. of Jowar, how much would he earn?
(a) Rs. 19425 (b) Rs. 18,500 (c) Rs. 15585 (d) None of these

38. What is the average price per kg. of Bajra sold by all the farmers together?
(a) Rs. 25.10 (b) Rs. 24.50 (c) Rs. 25 (d) Rs. 23.40

39. If farmer D and farmer E, both sell 240 kgs. of Bajra each, what would be the respective ratio of their earnings?
(a) 15 : 14 (b) 11 : 13 (c) 14 : 15 (d) 13 : 15

40. If farmer C sells 180 kgs. each of Corn. Paddy and Jowar grains how much would he earn?
(a) Rs. 13,540 (b) Rs. 12,550 (c) Rs. 13,690 (d) Rs. 12,690

41. Earnings on 150 kgs. of Paddy sold by farmer B are approximately what per cent of the earnings on the same amount of Rice sold by the same farmer?
(a) 65 (b) 69 (c)73 (d) 60

42. Scale implies:
(a) the degree of generalization represented (b) the degree to which places develop and change
(c) the size of the map (d) the size of the place

Direction: For Question 43-48 *read the passage carefully and answer the questions*
The teaching and transmission of North Indian classical music is, and long has been achieved by largely oral means. The raga and its structure, the often breathtaking intricacies of *tala* or rhythm, and the incarnation of rage and *tala as bandish* or composition, are passed thus, between *guru* and *shishya* by word of mouth and direct demonstration, with no printed sheet of notated music, as it were acting as a go-between. Saussure's conception of language as a communication between addresser and addressee is given, in this model, a further instance, and a new, exotic complexity and glamour
These days, especially with the middle-class having entered the domain of classical music and playing not a small part in ensuring the continuation of this ancient tradition, the tape recorder serves as a handy technological slave and preserves, from oblivion, the vanishing, elusive moment of oral transmission. Hoary gurus, too, have seen the advantage of this device, and increasingly use it as an aid to instruct their pupils; in place of the shawls and other traditional objects that used to pass from *shishya* to *guru* in the past, as a token of the regard of the former for the latter, it is not unusual, today, to see cassettes changing hands.
Part of my education in North Indian classical music was conducted via this rather ugly but beneficial rectangle of plastic, which I carried with me to England when I was an undergraduate. One cassette had stored in it various *tala's* played upon the tabla, at various tempos, by my music teacher's brother in-law, Hazarilalji, who was a teacher of Kathak dance, as well as a singer and a tabla player. This was a work of great patience and prescience, a one and half hours performance without any immediate point or purpose, but intended for some delayed future moment when I'd practise the *tala's* solitarily.
This repeated playing out of the rhythmic cycles on the tabla was inflected by the noises—an irate auto driver blowing a horn; the sound of overbearing pigeons that were such a nuisance on the banister; even the cry of a kulfi seller in summer—entering from the balcony of the third floor flat we occupied in those days, in a lane in a Mumbai suburb, before we left the city for good. These sounds, in turn, would invade, hesitantly, the edd and flow of silence inside the artificially heated room, in a borough of West London in which I used to live as an

undergraduate. There, in the trapped dust, silence and heat, the theka of the tabla, qualified by the imminent but intermittent presence of the Mumbai suburb, would come to life again. A few years later, the tabla and, in the background, the pigeons and the itinerant kulfi seller, would inhabit a small graduate room in Oxford.

The tape recorder though remains an extension of the oral transmission of music, rather than a replacement of it. And the oral transmission of North Indian classical music remains, almost uniquely, a testament to the fact that the human brain can absorb, remember and reproduce structures of great complexity and sophistication without the help of the hieroglyph or written mark or a system of notation. I remember my surprise on discovering that Hazarilalji—who had mastered Kathak dance, *tala* and North Indian classical music, and who used to narrate to me, occasionally, composition meant for dance that were grand and intricate in their verbal prosody, architecture and rhythmic complexity—was near illiterate and had barely learnt to write his name in large and clumsy letters.

Of course, attempts have been made, throughout the 20th century, to formally codify and even notate this music, and institutions set up and degrees created, specifically to educate students in this 'scientific' and codified manner. Paradoxically, however, this style of teaching has produced no noteworthy student or performer, the most creative musicians still emerge from the *guru-shishya* relationship, their understanding of music developed by oral communication.

The fact that North Indian classical music emanates from, and has evolved through, oral culture, means that this music has a significantly different aesthetic, and that this aesthetic has a different politics, from that of Western classical music. A piece of music in the Western tradition, at least in its most characteristic and popular conception, originates in its composer, and the connection between the two, between composer and the piece of music, is relatively unambiguous precisely because the composer writes down, in notation, his composition, as a poet might write down and publish his poem. However far the printed sheet of notated music might travel thus from the composer, it still remains his property; and the notion of property remains at the heart of the Western conception of 'genius', which derives from the Latin *gignere* or 'to beget'.

The genius in Western classical music is, then, the originator, begetter and owner of his work—the printed, notated sheet testifying to his authority over his product and his power, not only for expression or imagination, but of origination. The conductor is a custodian and guardian of this property. Is it an accident that Mandelstam, in his note-books, compares the conductor's baton to a policeman's, saying all the music of the orchestra lies mute within it, waiting for its first movement to release it into the auditorium?

The raga—transmitted through oral means— is, in a sense, no one's property; it is not easy to pin down its source, or to know exactly where its provenance or origin lies. Unlike the Western classical tradition, where the composer begets his piece, notates it and stamps it with his ownership and remains in effect larger than or the father of his work in the North Indian classical tradition, the raga unconfined to a single incarnation, composer or performer—remains necessarily greater than the artists who invokes it.

This leads to a very different politics of interpretation and valuation to an aesthetic that privileges the evanescent moment of performance and invocation over the controlling authority of genius and the permanent record. It is a tradition thus that would appear to value the performer as medium, more highly than the composer who presumes to originate what effectively, cannot be originated in a single person because the raga is the inheritance of a culture.

43. The author's contention that the notion of property lies at the heart of the Western conception of genius is best indicated by which one of the following ?
(a) The creative output of a genius is invariably written down and recorded.
(b) The link between the creator and his output is unambiguous.
(c) The word 'genius' is derived from a Latin word which means 'to beget'.
(d) The music composer notates his music and thus becomes the 'father' of a particular piece of music.

44. Saussure's conception of language as a communication between addresser and addressee according to the author is exemplified by the:
(a) teaching of North Indian classical music by word of mouth and direct demonstration.
(b) use of the recorded cassette as a transmission medium between the music teacher and the trainee.
(c) written down notation sheets of musical compositions.
(d) conductor's baton and the orchestra.

45. The author holds that the 'rather ugly but a beneficial rectangle of plastic, has proved to be a 'handy technological slave' in :
(a) storing the *talas* played upon the tabla at various tempos.
(b) ensuring the continuance of an ancient tradition.
(c) transporting North Indian classical music across geographical borders.
(d) capturing the transient moment of oral transmission.

46. The oral transmission of North Indian classified music is an almost unique testament of the :
(a) efficacy of the *guru-shishya* tradition.
(b) learning impact of direct demonstration.
(c) brain's ability to reproduce complex structures without the help of written marks.
(d) the ability of an illiterate person to narrate grand and intricate musical compositions.

47. According to the passage in the North Indian classical tradition the raga remains greater than the artist who invokes it. This implies an aesthetic which:
(a) emphasises performance and invocation over the authority of genius and permanent record.
(b) makes the music no one's property.
(c) values the composer more highly than the performer.
(d) supports oral transmission of traditional music.

48. Which one of the following cannot be inferred ?
(a) It is easy to transfer a piece of Western classical music to a distant place.
(b) The conductor in the Western tradition as a custodian can modify the music since it 'lies mute'in his baton.
(c) The authority of the Western classical music composer over his music product is unambiguous.
(d) The power of the Western classical music composer extends to the expression of his music.

49. Find binary of (-15)
(a) 11110000 (b) 11110001 (c) 11110011 (d) 11110010

50. Which of the following is not a movie file
(a) mpeg (b) png (c) 3gp (d) wmv

51. Which of the following is an application package?
(a) Microsoft Word (b) Microsoft Office (c) Adobe acrobat reader (d) Pagemaker

52. A light sensitive device that converts drawing, printed text or other images into digital form is
(a) Keyboard (b) Plotter (c) Scanner (d) OMR

53. Which protocol provides e-mail facility among different hosts?
(a) FTP (b) SMTP (c) TELNET (d) SNMP

54. The basic architecture of computer was developed by
(a) John Von Neumann (b) Charles Babbage
(c) Blaise Pascal (d) Garden Moore

55. Consider the following statements:
1. The President shall make rules for the more convenient transaction of the business of the Government of India, and for the allocation among Ministers of the said business.
2. All executive actions of the Government of India shall be expressed to be taken in the name of the Prime Minister.

Which of the statements given above is / are correct?
(a) 1 only (b) 2 only (c) Both 1 and 2 (d) Neither 1 nor 2

56. Which of the following are the discretionary powers given to the Governor of a State?
1. Sending a report to the President of India for imposing the President's rule
2. Appointing the Ministers
3. Reserving certain bills passed by the State Legislature for consideration of the President of India
4. Making the rules to conduct the business of the State Government
Select the correct answer using the code given below.
(a) 1 and 2 only (b) 1 and 3 only. (d) 2, 3 and 4 only. (d)1, 2, 3 and 4

57. Which of the following are associated with 'Planning' in India?
1. The Finance Commission
2. The National Development Council
3. The Union Ministry of Rural Development
4. The Union Ministry of Urban Development
5. The Parliament
Select the correct answer using the code given below.
(a) 1, 2 and 5 only (b)1, 3 and 4 only (c) 2 and 5 only (d) 1, 2, 3, 4 and 5

58. NBA was established in
(a) 1992 (b) 1994 (c) 1991 (d) 2001

59. Which of the following is central university..
1. Rajiv Gandhi University, Rono Hills, Doimukh, Itanagar - 791111.
2. Tezpur University, Dt. Sonitpur, PB No. 72, Tezpur.- 784 028.
3. Nalanda University, Rajgir, Dt. Nalanda, Bihar. (established under Central Act)
4. Guru Ghasidas Vishwavidyalaya, Main Campus, Koni, Bilaspur – 495009
(a) 1, 2, 3 (b) 2, 3, 4 (c) 1, 3, 4 (d) all four

60. Which of the following is known as 'Magna Carta of English Education in India'
(a) Mountstuart Elphinstone's minutes of 1823
(b) Lord Macaulay minutes of 1835
(c) Sir Charles Wood's Dispatch of 1854
(d) The Inter-University Board

PAPER-II

1. Which of the following operators are overloaded by default by the compiler in every user defined classes even if user has not written?
(1) Comparison Operator (==) (2) Assignment Operator (=)
(a)Both 1 & 2 (b) Only 1 (c) Only 2 (d) None of the Above

2. What is the Output of following program ?
```
#include<iostream>
usingnamespacestd;
intfun(intx = 0, inty = 0, intz)
{ return(x + y + z); }
intmain()
{
cout<< fun(10);
return0;
}
```
(a) 10 (b) 0 (c) 20 (d) Compile Error

3.
```
#include <iostream>
usingnamespacestd;
template<typenameT>
T max(T x, T y)
{
return(x > y)? x : y;
}
intmain()
{
cout<< max(3, 7) <<std::endl;
cout<< max(3.0, 7.0) <<std::endl;
cout<< max(3, 7.0) <<std::endl;
return0;
}
```
(a) 7, 7.0, 7.0
(b) Compiler Error in all cout statements as data type is not specified
(c) Compiler Error in last cout statement as call to max is ambiguous.
(d) None of the above

4. Which of the following is true?
(a) Static methods cannot be overloaded
(b) Static data members can only be accessed by static methods
(c) Non-static data members can be accessed by static methods
(d) Static methods can only access static members (data and methods)

5. Which of the followings is/are automatically added to every class, if we do not write our own.
(a) Copy Constructor (b) Assignment Operator
(c) A constructor without any parameter (d) All of the above

6. Which of the following commands or sequences of commands will rename a file x to file y in a Unix system?
I. mv y, x II.mv x, y III. cp y, x (rm x) IV. cp x, y (rm x)
(a)II and III (b) II and IV (c) I and III (d) II only

7. A user level process in Unix traps the signal sent on a Ctrl-C input, and has a signal handling routine that saves appropriate files before terminating the process. When a Ctrl-C input is given to this process, what is the mode in which the signal handling routine executes?
(a) kernel mode (b) superuser mode (c) privileged mode (d) user mode

8. Which command is used to copy all files having the string chap and any two characters after that to the progs directory?
(a) cp chap?? Progs (b) cp chap* progs (c) cp chap[12] /progs/*.* (d) None of the above

9. From the following instance of a relation scheme R (A, B, C), we can conclude that :

A	B	C
1	1	1
1	1	0
2	3	2
2	3	2

(a)A functionally determines B and B function-ally determines C
(b) A functionally determines B and B does not functionally determine C
(c) B does not functionally determine C
(d) A does not functionally determine B and B does not functionally determine C

10. SQL allows tuples in relations, and correspondingly defines the multiplicity of tuples in the result of joins. Which one of the following queries always gives the same answer as the nested query shown below:
select * from R where a in (select S.a from S)
(a) select R.* from R, S where R.a=S.a (D)
(b) select distinct R.* from R,S where R.a=S.a
(c) select R.* from R,(select distinct a from S) as S1 where R.a=S1.a
(d) select R.* from R,S where R.a=S.a and is unique R

11. Which one of the following is NOT a part of the ACID properties of database transactions?
(a) Atomicity (b) Consistency (c) Isolation (d) Deadlock-freedom

12. Consider a B+-tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?
(a) 1 (b) 2 (c) 3 (d) 4

13. Date items are fragmented, replicated and propagated in:
(a) DBMS (b) RDBMS (c) DML (d) DDBMS

14. A person trained to interact with a human expert in order to capture their knowledge.
(a) knowledge programmer (b) knowledge developer
(c) knowledge engineer (d) knowledge extractor

15. Which of the following is not a characteristic of a data warehouse?
(a) contains historical data (b) designed for decision support
(c) stores data in normalized tables (d) promotes data redundancy

16. A structure designed to store data for decision support.
(a) operational database (b) flat file
(c) decision tree (d) data warehouse

17. A B-Tree used as an index for a large database table has four levels including root node. If a new key is inserted in this index, then the maximum number of nodes that could be newly created in the process are
(a) 5 (b) 4 (c) 3 (d) 2

18. Which of the following permutations can be obtained in the output (in the same order) using a stack assuming that the input is the sequence 5, 7, 8, 4, 6 in that order?
(a) 6, 8, 4, 7, 5 (b) 6, 4, 5, 7, 8
(c) 6, 4, 7, 8, 5 (d) 7, 8, 4, 6, 5

19. Which of these cable is/are used to connect devices to hubs and switches?
(a) Crossover (b) Straight-through (c) Co-axial (d) Both A and B

20. Which of the following system calls results in the sending of SYN packets?
(a) Socket (b) bind (c) listen (d) connect

21. In communication the difference between the highest and the lowest frequencies available for transmission in any given range is called?
(a) Baud rate (b) Response time (c) bandwidth (d) None of the above

22. _____is a technique of conversion between the representation of digital data in user equipment and the corresponding signals transmitted over a communications channel?
(a) Line Coding (b) Demodulation (c) Modulation (d) Segementation

23. The key concern in the design of transmission system is_____ and_____?
(a) Data rate, Distance (b) Speed, Accuracy
(c) Accuracy, Simplicity (d) Distance, Cost

24. The Hamming Distance for the codes generated using either even or odd parity will be?
(a) 2 (b) 4 (c) 1 (d) 0

25. The Unix command : $ vi file1 file2
(a) Edits file1 and stores the contents of file1 in file2
(b) Both files i.e File1 and file2 can be edited using "ex" command to travel between files
(c) Both files can be edited using the "mv" command to move between the files
(d) Edits file1 first, saves it and the edits file2

26. In the index allocation scheme of blocks to a file, the maximum possible size of the file depends on
(a) The number of blocks used for the index, and the size of the index
(b) The size of the blocks, and the size of the address
(c) size of the index
(d) size of the blocks

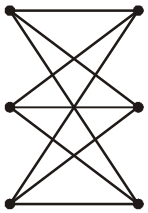
27. In _____ allocation method for disk block allocation in a file system, insertion and deletion of blocks in a file is easy.
(a) Index (b) Linked (c) Contiguous (d) Bit Map

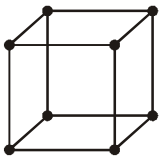
28. Message passing system allows processes to :
(a) communicate with one another without resorting to shared data.
(b) communicate with one another by resorting to shared data.
(c) share data
(d) name the recipient or sender of the message

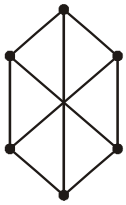
29. If the size of logical address space is 2 to the power of m, and a page size is 2 to the power of n addressing units, then the high order _____ bits of a logical address designate the page number, and the ____ low order bits designate the page offset.
(a) m, n (b) n, m (c) m – n, m (d) m – n, n

30. Which one of the following is the tightest upper bound that represents the time complexity of inserting an object into a binary search tree of n nodes?
(a) O(1) (b) O(log n) (c) O(n) (d) O(n log n)

31. Consider the following graph


G1


G2


G3

Which of the above graph is planar?
(a) G1 only (b) G2 only (c) G1 and G2 only (d) G1, G2 and G3

32. Consider the following expression with infix notation
A * B - (C + D) * (E / 5) ^ F
What is the maximum height of the **operator** stack during conversion from infix to postfix ?
(a) 3 (b) 4 (c) 5 (d) 6

33. Match the following :

I. 0 (log n)	1. Heap sort
II. 0 (n)	2. DFS
III. 0 (n log n)	3. Binary search
IV. 0 (n^2)	4. Bubble sort

(a) I – 3, II – 2, III – 1, IV – 4 (b) I – 4, II – 1, III – 3, IV – 2
(c) I – 3, II – 1, III – 2, IV – 4 (d) I – 3, II – 2, III – 4, IV – 1

34. Consider the regex: (a+b)*(a+b+$\in$)a
Which of the following is equivalent to above?:
(a) (a*+b*)+(aa+ba) (b) ($\in$+a+b*)+a
(c) (a+b)+(a+b+$\in$)a (d) None of these

35. The grammar guaranteed by production rules
$S \rightarrow aSBc$, $CB \rightarrow BC$, $aB \rightarrow aa$ is
(a) anbncn , $\geq 1n$ (b) anbn c n , $\geq 0n$ (c) anbncn , n > 0 (d) anbncn , ≤ 0

36. Which of the statements is/are TRUE?
1. A CFG (Context Free Grammar) may be equivalent to a non-CFG.
2. Grammar {S $\rightarrow$ ab|abc} is both left linear and right linear.
3. Grammar {S $\rightarrow$ aA|Bb|a| is both left linear and right linear
(a) 1 and 3 only (b) 1 and 2 only (c) 3 only (d) 2 only

37. Consider the following translation scheme.
$S \rightarrow ER$

$R \rightarrow *E\{print('*');\}R|\varepsilon$
$E \rightarrow F+E\{print('+');\}|F$
$F \rightarrow S|id\{print(id.value);\}$
Here *id* is a token that represents an integer and *id.value* represents the corresponding integer value. For an input '2 * 3 + 4', this translation scheme prints
(a) 2 * 3 + 4 (b) 2 * +3 4 (c) 2 3 * 4 + (d) 2 3 4+*

38. The following SDT is

$E \to E_1 + T \{E.val = E_1.val + T.val\}$

$E \to T \quad \{E.val = T.val\}$

$T \to id \quad \{T.val = id\}$

(a) S-attributed (b) L-attributed (c) Both (a) and (b) (d) None of these

39. Consider sets A, B and C such that |A|, |B|, |C| ≥ 0

1. $A \cap (B - A) = \phi$ 2. $A - C \subseteq A - B - C$ 3. $(A \cap B) \cup (A \cap \overline{B}) = A$

4. $(A - C) \cap (C - B) = \phi$

Which of the above statements is/are always True?

(a) 1 and 3 (b) 1, 2 and 3 (c) 2 and 4 (d) 1, 3 and 4

40. Let X, Y, Z be sets, |X| is cardinality of X represents number of elements in X and P(X) is power set of X. Assume |Y| = k and |Z| = n. If X = Y × Z and W = P(X) then find the numbers of functions from X to W.

(a) 2^{2nk} (b) $n^{(kn)^2}$ (c) $2^{(kn)^2}$ (d) None of these

41. A binary relation R on Z × Z is defined as follows : (a, b) R (c, d) iffa = c or b = d

Consider the following propositions :

1. R is reflexive. **2.** R is symmetric. **3.** R is antisymmetric

Which one of the following statements is True?

(a) Both 1 and 2 are true (b) 1 is true and 2 is false

(c) 1 is false and 3 is true (d) Both 2 and 3 are true

42. Consider the following statements :

$P_1 : ((A \to B) \vee C) \equiv ((A \vee C) \to (B \vee C))$

$P_2 : ((A \vee B) \leftrightarrow C) \equiv ((A \leftrightarrow C) \vee (B \leftrightarrow C))$

$P_3 : ((A \leftrightarrow B) \wedge C) \equiv ((A \wedge C) \leftrightarrow (B \wedge C))$

Which of the following is true?

(a) All P_1, P_2, P_3 are valid (b) P_1 and P_2 is valid but not P_3

(c) P_1 is valid but not P_2, P_3 (d) Neither P_1, P_2, P_3 is valid

43. Which one of the following models is not suitable for accommodating any change?

(a) Build & Fix Model (b) Prototyping Model

(c) RAD Model (d) Waterfall Model

44. Given an unsorted array. The array has this property that every element in array is at most k distance from its position in sorted array where k is a positive integer smaller than size of array. Which sorting algorithm can be easily modified for sorting this array and what is the obtainable time complexity?

(a) Insertion Sort with time complexity O(kn) (b) Heap Sort with time complexity O(n log k)

(c) Quick Sort with time complexity O(k log k) (d) Merge Sort with time complexity O(k log k)

45. Which one of the following is NOT a functional requirement ?

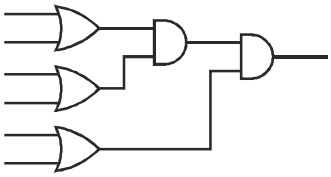
(a) Maintainability (b) Portability (c) Robustness (d)convinence

46. Consider a banking application which requires 25,700 LOC. If the productivity of a person in 670 loc per month, consider the salary of the developer is $500 per month, find the cost of the application?

(a)18500 (b)19180 (c)17800 (d)none

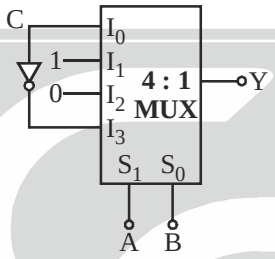
47. Consider a DRDO application in the development, company predicts the size of the entire application as follows:
4600 KLOC optimistic
5900 KLOC most likely
7600 KLOC pessimistic
First calculate the predicated size using which find the productivity if the software development effort is 6 person month?
(a) 995 (b) 690 (c) 1050 (d) 549

48. The minimum no of Nor gate requires for the following



(a) 5 (b) 7 (c) 6 (d) none

49. The output of the given 4 : 1 MUX will be



(a) $\sum$m(1,2,3,6) (b) $\sum$m(2,4,5,7) (c) $\sum$m(1,3,4,7) (d) $\sum$m(1,2,6,7)

50. Which of the following statements are true about the number -43?
S_1 : It can be represented as 1111010101 using 2's complement representation.
S_2 : It can be represented as 10101011 using signed magnitude representation
S_3 : It can be represented as 010100 using 1's complement representation
(a) S_1,S_2 only (b) S_1,S_2,S_3 (c) S_3 only (d) S_1,S_3 only

Space for rough work

TEST SERIES UGC-NET/JRF Jan. 2017

BOOKLET SERIES D

Paper Code 87

Test Type: TEST SERIES

Paper III

COMPUTER SCIENCE & APPLICATIONS

Duration: 02:00 Hours

Date: 09-01-2017

Maximum Marks: 150

Read the following instructions carefully:

1 Attempt all the questions.

2. **Paper-III: 75Q.** Each question carry **2(Two)** Marks.

3. There will be no negative marking.

4. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

5. For rough work, blank sheet is attached at the end of test booklet.

6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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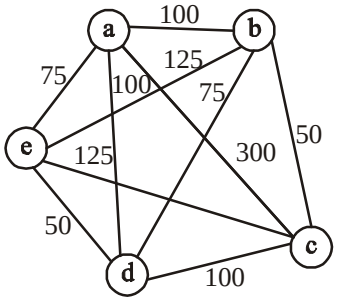
PAPER-III

1. What is cost of TSP, if starting vertex is a?



(a) 250 (b) 300 (c) 550 (d) 375

2. The following data contains 100 symbols. If Huffman coding is applied to the given data

Symbol	*S*	*C*	*O*	*F*	*I*	*E*	*L*	*D*
Probability	$\frac{12}{100}$	$\frac{28}{100}$	$\frac{10}{100}$	$\frac{7}{100}$	$\frac{13}{100}$	$\frac{8}{100}$	$\frac{16}{100}$	$\frac{6}{100}$

What is the code for the letter 'E' if '0' as taken left and '1' is right
(a) 101 (b) 100 (c) 110 (d) 111

3. A Binary Search Tree (BST) stores values on the range 37 to 573. Consider the following sequence of keys
i. 81, 537, 102, 439, 285, 376, 305
ii. 52, 97, 121, 195, 242, 381, 472
iii. 142, 248, 520, 386, 345, 270, 307
iv. 550, 149, 507, 395, 463, 402, 270
Which of the following statements is TRUE ?
(a) i, ii and iv are inorder sequences of three different BSTs
(b) i is a preorder sequence of some BST with 439 as the root
(c) ii is an inorder sequence of some BST where 121 is the root and 52 in a leaf
(d) iv is a post order sequence of some BST with 149 as the root

4. A student wishes to create symbolic links in a computer system running Unix. Three text files named "file 1", "file 2" and "file 3" exist in her current working directory and the student has read and write permissions for all three files. Assume that file 1 contains information about her hobbies, file 2 contains information about her friends and file 3 contains information about her courses. The student executes the following sequence of commands from her current working directory
ln -s file 1 file 2
ln -s file 2 file 3
Which of the following types of information would be lost from her file system?
(I) Hobbies (II) Friends (III) Courses
(a) I and II only (b) II and III only (c) II only (d) I and III only

5. The shell command, find -name passwd -print is executed in /etc directory of a computer system running Unix. Which of the following shell commands will give the same information as the above command when executed in the same directory?
(a) lspasswd (b) cat passwd
(c) grep name passwd (d) grep print passwd

6. How does C++ compiler differs between overloaded postfix and prefix operators?
(a) C++ doesn't allow both operators to be overlaoded in a class
(b) A postfix ++ has a dummy parameter
(c) A prefix ++ has a dummy parameter
(d) By making prefix ++ as a global function and postfix as a member function

7. Which of the following in Object Oriented Programming is supported by Function overloading and default arguments features of C++.
(a) Inheritance (b) Polymorphism (c) Encapsulation (d) None of the Above

8. Which of the following is true about templates.
(1) Template is a feature of C++ that allows us to write one code for different data types.
(2) We can write one function that can be used for all data types including user defined types. Like sort(), max(), min(), .etc.
(3) We can write one class or struct that can be used for all data types including user defined types. Like Linked List, Stack, Queue ..etc.
(4) Template is an example of compile time polymorphism.
(a) 1 & 2 (b) 1, 2 & 3 (c) 1, 2 & 4 (d) 1, 2, 3 & 4

9. Output of following C++ program?
```
#include <iostream>classTest{public:    voidfun();};staticvoidTest::fun()
{
 std::cout<<"fun() is static\n";}
intmain()
{    Test::fun();
return0;}
```
(a) fun() is static (b) Empty Screen (c) Compiler Error (d) None of the above

10.
```
#include<iostream>
usingnamespacestd;
classPoint {
public:
Point() { cout<< "Constructor called"; }
};
intmain()
{
Point t1, *t2;
return0;
}
```
(a) Compiler Error
(b) Constructor Called Constructor Called
(c) Constructor Called
(d) None of the Above

11. What is the use of this pointer?
(a) When local variable's name is same as member's name, we can access member using this pointer.
(b) To return reference to the calling object
(c) Can be used for chained function calls on an object
(d) All of the above

12. Which of the following is FALSE about abstract classes in Java
(a) If we derive an abstract class and do not implement all the abstract methods, then the derived class should also be marked as abstract using 'abstract' keyword
(b) Abstract classes can have constructors
(c) A class can be made abstract without any abstract method
(d) A class can inherit from multiple abstract classes

13. For $a \in [0,1]$, the boundary condition for the t-norm function *i* is

(a) i(a, 1) = 0 (b) i(a, 0) = a (c) i (a, 1) = a (d) i(a, 0) = 1

14. For standard fuzzy intersection, which of the following hold?

(a) i(a, b) = min (a, b) (b) i(a, b) = ab
(c) i(a, b) = a–b (d) none of these

15. If two fuzzy sets A and B are given with membership functions

$\mu_A(x) = \{0.2, 0.4, 0.8, 0.5, 0.1\}$ $\mu_B(x) = \{0.1, 0.3, 0.6, 0.3, 0.2\}$

Then the value of $\mu\,\overline{A \cap B}$ will be

(a) {0.9, 0.7, 0.4, 0.8, 0.9} (b) {0.2, 0.4, 0.8, 0.5, 0.2}
(c) {0.1, 0.3, 0.6, 0.3, 0.1} (d) {0.7, 0.3, 0.4, 0.2, 0.7}

16. Consider the two class classification task that consists of the following points:

Class C_1 : [−1, −1], [−1, 1], [1, −1]

Class C_2 : [1, 1]

The decision boundary between the two classes C_1 and C_2 using single perception is given by :

(a) $x_1 - x_2 - 0.5 = 0$ (b) $-x_1 + x_2 - 0.5 = 0$

(c) $0.5(x_1 + x_2) - 1.5 = 0$ (d) $x_1 + x_2 - 0.5 = 0$

17. Given a rule of the form IF X THEN Y, rule *confidence* is defined as the conditional probability that

(a) Y is true when X is known to be true. (b) X is true when Y is known to be true.
(c) Y is false when X is known to be false. (d) X is false when Y is known to be false.

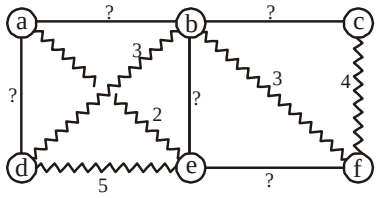
18. Association rule *support* is defined as

(a) the percentage of instances that contain the antecendent conditional items listed in the association rule.
(b) the percentage of instances that contain the consequent conditions listed in the association rule.
(c) the percentage of instances that contain all items listed in the association rule.
(d) the percentage of instances in the database that contain at least one of the antecendent conditional items listed in the association rule.

19. Consider the array of size n. the first (n – 1) elements are already sorted. What is the worst case time complexity to insert a n^{th} element in an array after insertion the array should be in sorted order

(a) O(1) (b) O(n) (c) O(n log n) (d) $O(n^2)$

20. Consider the following undirected graph with some edge costs missing.



Suppose the way edges form a Minimum Cost Spanning Tree for G. Then, which of the following inequalities NEED NOT bold?

(a) $\cos t(a,b) \geq 6$ (b) $\cos t(b,c) \geq 5$ (c) $\cos t(c, f) \geq 5$ (d) $\cos t(a,d) \geq 1$

21. A decision tree is built to determine individuals likely to default on an unsecured loan. The null hypothesis states that an individual will not default on the loan. The decision tree correctly classifies 80% of the instances in a test dataset. Fifteen percent of the mistakes made by the model are type 1 errors. What can be said about the performance of the model?

(a) The accuracy of the model for correctly determining those individuals who did not default on their loan was at least 75%.
(b) The accuracy of the model for correctly determining those individuals who defaulted on their loan was at least 75%.
(c) The majority of errors made by the model accepted individuals who defaulted.
(d) The majority of errors made by the model rejected individuals who did not default.

22. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH $\rightarrow$ G, A $\rightarrow$ BC, B $\rightarrow$ CFH, E $\rightarrow$ A, F $\rightarrow$ EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?

(a) 3 (b) 4 (c) 5 (d) 6

23. **Table A:**

Id	Name	Age
12	Arun	60
15	Shreya	24
99	Rohit	11

Table B:

Id	Name	Age
15	Shreya	24
25	Hari	40
98	Rohit	20
99	Rohit	11

Table C :

Id	Phone	Area
10	2200	02
99	2100	01

Consider the above tables A, B and C. How many tuples does the result of the following SQL query contains?

```
SELECT A.id
FROM   A
WHERE  A.age> ALL (SELECT B.age
       FROM   B
WHERE  B. name = "arun")
```

(a) 4 (b) 3 (c) 1 (d) 0

24. Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item x, denoted by r(x) and w(x) respectively. Which one of them is conflict serializable.

(a) $r_1(x); r_2(x); w_1(x); r_3(x); w_2(x)$ (b) $r_2(x); r_1(x); w_2(x); r_3(x); w_1(x)$

(c) $r_3(x); r_2(x); r_1(x); w_2(x); w_1(x)$ (d) $r_2(x); w_2(x); r_3(x); r_1(x); w_1(x)$

25. An index is clustered, if

(a) it is on a set of fields that form a candidate key
(b) it is on a set of fields that include the primary key.
(c) the data records of the file are organized in the same order as the data entries of the index.
(d) the data records of the file are organized not in the same order as the data entries of the index.

26. Which of the following tuple relational calculus expression(s) is/are equivalent $\forall t \in r\left(P(t)\right)$?

(I) $\neg\exists t \in r\left(P(t)\right)$ (II) $\exists t \notin r\left(P(t)\right)$ (III) $\neg\exists t \in r\left(\neg P(t)\right)$ (IV) $\exists t \notin r\left(\neg P(t)\right)$

(a) I only (b) II only (c) III only (d) III and IV

27. You have a network ID of 131.107.0.0 with eight subnets. You need to allow the largest possible number of host ID's per subnet. Which subnet mask you should assign?

(a) 225.225.192.0 (b)255.255.240.0 (c)255.255.248.0 (d)255.255.252.0

28. Sending a message to a well defined group that are numerically large in size but small compared to the network as a whole is called .....

(a) Unicasting (b) Multicasting (c) Broadcasting (d) None of these

29. If router J is on the optimal path from router I to router K, then the optimal path from J to K also falls along the same route is known as .....

(a) Routing principle (b) Optimality principle
(c) Sink tree principle (d) Network principle

30. Which of these is true for go-back-N protocol, if m is the size of sequence number field.

(a) size of send window must be less than 2m and size of receiver window must be 1
(b) size of send window must be greater than 2m and size of receiver window must be 1
(c) size of send window must be less than 2m and size of receiver window must be 2m
(d) size of send window must be greater than 2m and size of receiver window must be 2m

31. What is the type of network in which the routers themselves are mobile?

(a) Wide Area Network (b) Mobile Ad hoc Network
(c) Mobile Network (d) Local Area Network

32. While transmitting odd-parity coded symbols, the number of zeros in each symbol is:

(a) odd (b) even (c) Both (a) and (b) (d) unknown

33. Consider three processes (process id 0, 1, 2 respectively) with compute time bursts 2, 4 and 8 time units. All processes arrive at time zero. Consider the longest remaining time first (LRTF) scheduling algorithm. In LRTF ties are broken by giving priority to the process with the lowest process id. The average turn around time is:

(a) 13 units (b) 14 units (c) 15 units (d) 16 units

34. Three processes A, B and C each execute a loop of 100 iterations. In each iteration of the loop, a process performs a single computation that requires tc CPU milliseconds and then initiates a single I/O operation that lasts for tio milliseconds. It is assumed that the computer where the processes execute has sufficient number of I/O devices and the OS of the computer assigns different I/O devices to each process. Also, the scheduling overhead of the OS is negligible. The processes have the following characteristics:

Process	id	tctio
A	100ms	500 ms
B	350 ms	500 ms
C	200 ms	500 ms

The processes A, B, and C are started at times 0, 5 and 10 milliseconds respectively, in a pure time sharing system (round robin scheduling) that uses a time slice of 50 milliseconds. The time in milliseconds at which process C would complete its first I/O operation is _____.

(a) 500 (b) 1000 (c) 2000 (d) 10000

35. A process has been allocated 3 page frames. Assume that none of the pages of the process are available in the memory initially. The process makes the following sequence of page references (reference string): 1, 2, 1, 3, 7, 4, 5, 6, 3, 1

If optimal page replacement policy is used, how many page faults occur for the above reference string?

(a) 7 (b) 8 (c) 9 (d) 10

36. Consider a paging hardware with a TLB. Assume that the entire page table and all the pages are in the physical memory. It takes 10 milliseconds to search the TLB and 80 milliseconds to access the physical memory. If the TLB hit ratio is 0.6, the effective memory access time (in milliseconds) is _____.
(a) 120 (b) 122 (c) 124 (d) 118

37. In a system with 32 bit virtual addresses and 1 KB page size, use of one-level page tables for virtual to physical address translation is not practical because of
(a) the large amount of internal fragmentation
(b) the large amount of external fragmentation
(c) the large memory overhead in maintaining page tables
(d) the large computation overhead in the translation process

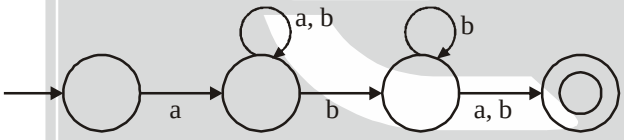
38. The line graph L(G) of a simple graph G is defined as follows:
- There is exactly one vertex v(e) in L(G) for each edge e in G.
- For any two edges e and e' in G, L(G) has an edge between v(e) and v(e'), if and only if e and e' are incident with the same vertex in G. Which of the following statements is/are TRUE?

P. The line graph of a cycle is a cycle.
Q. The line graph of a clique is a clique.
R. The line graph of a planar graph is planar.
S. The line graph of a tree is a tree.
(a) P only (b) P and R only (c) R only (d) P, Q and S only

39. Which of the following languages is/are regular
i. {$a^n(bc)^m$: n>=0, m>n} ii.{$a^{2\wedge n}$: n>=0}
iii. $a^n a^n a^n$: n>=0} iv. { $0^{mk}1^{nk}$ | 0<=k<=5, m,n,k" N}
(a) i only (b) i and ii only (c) iii and iv only (d) i, ii, iii, iv

40. Consider the following FA

$\sum = \{a, b\}$



Number of strings of length 5 accepted by this NFA is
(a) 8 (b) 10 (c) 12 (d) 14

41. L1 ={a^p / p is prime}
L2 ={a^p / p is odd}
S1 : L1 *" L2 is regular
S2 : Regular expression of L1 *" L2 is a(aa)*
(a) S1 is decidable(correct), S2 is undecidable(not correct)
(b) S1,S2 is decidable
(c) S1 , S2 is undecidable
(d) None

42. Consider the following languages
L1 = {$a^n b^n c^n$|n>=0}
L2= {$b^i c^j$|I, j>=0}
What is L1/L2
(a) {$a^p b^q c^r$|p=q>=r OR p>=q AND r=0} (b) {$a^p b^q c^r$|p>q>=r OR p>=q AND r=0}
(c) {$a^p b^q c^r$|p!=q>=r OR p>=q AND r=0} (d) {$a^p b^q c^r$|p<q>=r OR p<=q AND r=0}

43. Which of the following regular expressions will not generate a string with two consecutive 1s? (Not that ε denotes the empty string).

I. $(1+\varepsilon)(01+0)*$

II. $(01+10)*$

III. $(0+1)*(0+\varepsilon)$

(a) I only (b) II only (c) III only (d) I and II only

44. $S \rightarrow aSbS / bSaS / \varepsilon$

In the predictive parse table M of the above grammar $M[S, a] =$ _____

(a) $S \rightarrow aSbS$ (b) $S \rightarrow bSaS$ (c) $S \rightarrow \varepsilon$ (d) $S \rightarrow aSbS, S \rightarrow \varepsilon$

45. Consider the grammar given below. It is
$E \rightarrow T+E \mid T$
$T \rightarrow a$
(a) SLR(1) but not LL(1) (b) Not an operator grammar
(c) Ambiguous (d) None of these

46. How much memory is required to implement z-buffer algorithm for a 512 × 512 × 24 bit-plane image?
(a) 768 KB (b) 1 MB (c) 1.5 MB (d) 2 MB

47. A frame buffer array is addressed in row major order for a monitor with pixel locations starting from (0,0) and ending with (100,100). What is address of the pixel(6,10)? Assume one bit storage per pixel and starting pixel location is at 0.
(a) 1016 (b) 1006 (c) 610 (d) 616

48. Take the unit square defined by the four points (0, 0),(1, 0),(1, 1),(0, 1) and rotate it by 30º around the origin. Where do the four points end up? (Note that sin 30º = 0.500 and cos 30º = 0.866.)
(a) (0, 0),(0.866, 0.500),(0.366, 1.366),(“0.500, 0.866)
(b) (0, 0),(0.500, 0.866),(1.366, 0.366),(0.866, “0.500)
(c) (0, 0),(0.866, 0.500),(0.366, 1.366),(“0.500, 1.366)
(d) (0, 0),(0.866, 0.500),(0.366, 1.366),(0.500, “0.866)

49. If the transformation matrices S represent scaling and T translation, what is the result of applying a translation followed by a scaling to the point P?
(a) STP (b) TSP (c) SP + T (d) S(P + T)

50. In a digital communication system, transmission of successive bits through a noisy channel are assumed to be independent events with error probability p. The probability of at most one error in the transmission of an 8-bit sequence is

(a) $7(1-p)/+p/8$ (b) $(1-p)^8+8P(1-p)^7$

(c) $(1-p)^8+(1-p)^7$ (d) $(1-p)^8+p(1-p)^7$

51. Let U and V be two independent and independent and identically distributed random variables such that $(U=+1)=P(U=-1)=\frac{1}{2}$. The entropy H(U+V) in bits is

(a) 3/4 (b)1 (c) 3/2 (d)$\log_2 3$

52. A source generates three symbols with probability 0.25, 0.25, 0.50 at a rate of 3000 symbols per second. Assuming independent generation of symbols, the most efficient source encoder would have average bit rate of
(a) 6000 bits/sec (b)4500 bits/sec (c) 3000 bits/sec (d)1500 bits/sec

53. A source produces 4 symbols with probability 1 2 , 1 4 , 1 8 and 1 8 . For this source, a practical coding scheme has an average codeword length of 2 bits/symbols. The efficiency the code is
(a) 1 (b)7/8 (c) ½ (d)1/4

54. p: = 1; k: = O;
while k < n do
begin
p: = 2 * p;
k: = k + 1;
end;
For the program fragment above involving integers p, k, and n, which of the following is a loop invariant; i.e., true at the beginning of each execution of the loop and at the completion of the loop?
(a) p = k + 1 (b) p = (k + 1)2 (c) p = (k + 1)2k (d) p = 2k

55. Assume that a CPU can process 108108 operations per second. Suppose you have to sort an array with 106106 elements. Which of the following is true?
(a) Insertion sort will always take more than 2.5 hours while merge sort will always take less than 1 second.
(b) Insertion sort will always take more than 2.5 hours while quicksort will always take less than 1 second
(c) Insertion sort could take more than 2.5 hours while merge sort will always take less than 1 second.
(d) Insertion sort could take more than 2.5 hours while quicksort will always take less than 1 second.

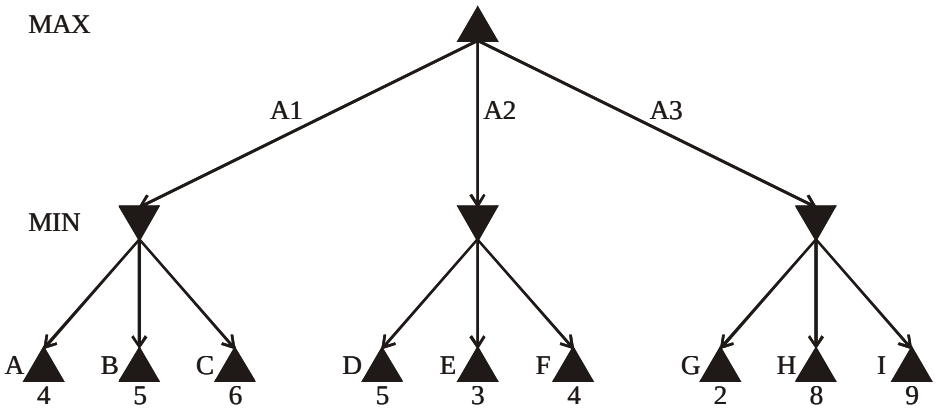
56. Consider an A* search algorithm for which $h(n) = 0$. To which of the following search algorithms is this A* equivalent?
(a) Greedy best-first search (b) Depth-First Search
(c) Uniform Cost Search (d) None of these

57. Consider the following Tower of Hanoi problem.

Left : Initial state **Right : Goal state**

The cost of moving the small disk is 1, moving the middle sized disk is 2, and moving the large disk is 3. Hence the average cost is 2. Define the heuristic function *h* as follows: 2 × *number of disks not on the rightmost peg*.
What is the *h* value of the initial state?
(a) 3 (b) 4 (c) 5 (d) 6

58. Consider the following part of a two-player game tree.



What will be the value of the top MAX node

(a) 4 (b) 6 (c) 8 (d) 9

59. A search problem can be described by a directed finite search graph, cf. Chapter 3 Consider the following statements:

(i) The Depth First search Algorithm terminates on the search problem if the corresponding directed search graph contains no cycles.

(ii) If the directed search graph contains no cycles then the Depth First Search Algorithm terminates on the corresponding search problem.

Which of the following claims is true?

(a) Both statements (i) and (ii) are false (b) Only statement (ii) is true

(c) Only statement (i) is true (d) Both statements (i) and (ii) are true.

60. Find the initial BFS using least cost method

	City-1	City-2	City-3	City-4	
Part-I	8	6	10	9	45
Part-II	9	12	13	7	60
Part-III	14	9	16	5	50
	45	30	40	40	

(a) 1320 (b) 1410 (c) 1560 (d) 1260

61. For maximization problem

	A	B	C	D
P	11	11	9	9
Q	13	16	11	10
R	12	17	13	8
S	16	14	16	12

Find optimal solution using assignment problem

(a) 52 (b) 60 (c) 65 (d) 55

62. In suiplex if all non basic variable have negative value of Δj where a_0 basic variable are zero then also has ..... solution.

(a) Infeasible (b) Unbounded (c) Optimal (d) None of these

63. Given cpp problem

min $2 = -50x + 20y$

$2x - y \geq -5$

$3x + y \geq 3$

$2x - 3y \leq 12$

$xy \geq 0$

has ..... solution.

(a) unbounded (b) feasible (c) no feasible (d) none of these

64. Let {p, q, r, s} be the set. A binary operation $*$ is defined on the set and is given by the following table

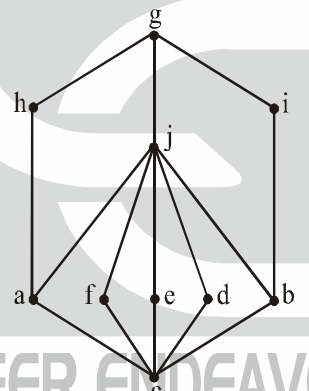
$*$	p	q	r	s
p	p	r	s	p
q	p	q	r	s
r	p	q	p	r
s	p	q	q	q

Which of the following is true about the binary operation?

(a) It is commutative but not associative (b) It is associative but not commutative

(c) It is both associative and commutative (d) It is neither associative nor commutative

65. Consider the following lattice



How many number of complements for the element 'b'?

(a) 1 (b) 3 (c) 5 (d) 7

66. Assume the following predicate and constant symbols :

B (x, y) : x bought y

L (x, y) : x is longer than y

J (x) : x is a jeans

v : vinod and r : Rohit

Which of the following predicate logic formula represents the following sentence?

"Rohit bought a jeans which is longer than any of the Vinod's jeans".

(a) $\forall x \ \forall y(B(r, x) \wedge B(v, x) \rightarrow L(x, y))$

(b) $\exists x \ \forall y(J(x) \wedge B(r, x) \rightarrow J(y) \wedge B(v, y) \wedge L(x, y))$

(c) $\exists x(J(x) \wedge B(r, x) \rightarrow \forall y(J(y) \wedge B(v, y) \rightarrow L(x, y)))$

(d) None of these

67. In order to pass BE first semester examination minimum marks have to be secured in each of the 7 subjects. In how many cases can a student fail?

(a) 128 (b) 129 (c) 126 (d) 127

68. Consider the following program

```
foo(n)
{
 if (n = = 1)
    P(n)
      else
    Q() + foo(n-1);
}
```

What is the time complexity for the given function, if the function 'P' and function 'Q' take O(n) and O(1) unit of time respectively.

(a) O(n) (b) $O(n^2)$ (c) O(n log n) (d) O(log n)

69. The modification of the software to match changes in the ever changing environment, falls under which category of software maintenance?

(a) Corrective (b) Adaptive (c) Perfective (d) Preventive

70. Consider a digital image processing application which contains 3 modules

M_1 = 24.4 KLOC
M_2 = 21.5 KLOC
M_3 = 19.4 KLOC

If the productivity of the developer is 3KLOC per month, find the effort required in person-month(pm)?

(a)13.3 (b)16.8 (c)21.8 (d)22.2

71. Compilers, Editors software come under which type of software?

(a) System software (b) Application software
(c) Scientific software (d) None of the above.

72. Assume that the size of an organic type software product has been estimated to be 22,000 lines of source code. Assume that the average salary of software engineers be Rs. 15,000/- per month. Determine the effort required to develop the software product and the nominal development and cost time using basic ?(use a_b=2.4, b_b=1.05,c_b=2.5,d_b=.38) cocomo.

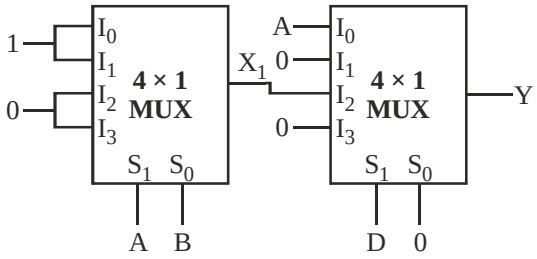
(a) E=91 TIME= 15
(b) E=78 TIME= 11
(c) E=91 TIME= 14
(d) E=118 TIME= 19

73. Let f (w, x, y, z) = $\sum$ (0, 1, 3, 4, 5, 10, 11, 12, 13, 15), which of the following expression are NOT equivalent to 'f'?

(a) $f = w'y'+xy'+w'x'z + wyz + wx'y$ (b) $f = wxz + w'y'+xy'+wx'y + wyz$

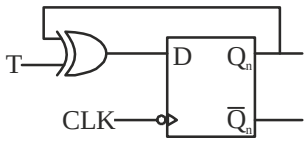
(c) $f = w'y'+xy'+x'yz + wyz + wx'y$ (d) $f = w'y'+xy'+wx'y + w'x'z + wyz$

74. What will be the output of multiplexer shown below



(a) $A \oplus B$ (b) $A \Theta D \Theta B$ (c) $A + D + \overline{B}$ (d) $A \,.\, D$

75. The figure shown below is



(a) D-FF to T-FF conversion (b) T-FF to D-FF conversion
(c) JK to D-FF conversion (d) None of these

Space for rough work

COMPUTER SCIENCE & APPLICATIONS
TEST SERIES-IV
PART-I

Date : 09-01-2017

1. (b)	2. (a)	3. (c)	4. (d)	5. (c)	6. (d)	7. (a)
8. (d)	9. (b)	10. (c)	11. (d)	12. (d)	13. (a)	14. (d)
15. (c)	16. (b)	17. (c)	18. (d)	19. (d)	20. (c)	21. (d)
22. (d)	23. (d)	24. (d)	25. (c)	26. (c)	27. (c)	28. (a)
29. (d)	30. (c)	31. (b)	32. (d)	33. (c)	34. (c)	35. (d)
36. (c)	37. (d)	38. (a)	39. (c)	40. (d)	41. (c)	42. (a)
43. (c)	44. (a)	45. (d)	46. (c)	47. (a)	48. (d)	49. (b)
50. (b)	51. (b)	52. (c)	53. (b)	54. (a)	55. (a)	56. (b)
57. (c)	58. (b)	59. (d)	60. (c)			

PART-II

1. (a)	2. (d)	3. (c)	4. (d)	5. (c)	6. (b)	7. (a)
8. (a)	9. (c)	10. (c)	11. (d)	12. (b)	13. (d)	14. (c)
15. (c)	16. (d)	17. (a)	18. (d)	19. (a)	20. (d)	21. (c)
22. (a)	23. (a)	24. (c)	25. (c)	26. (a)	27. (a)	28. (a)
29. (d)	30. (c)	31. (b)	32. (b)	33. (a)	34. (b)	35. (*)
36. (b)	37. (d)	38. (b)	39. (d)	40. (c)	41. (a)	42. (c)
43. (d)	44. (b)	45. (d)	46. (b)	47. (a)	48. (c)	49. (a)
50. (a)						

PART-III

1. (d)	2. (d)	3. (c)	4. (b)	5. (c)	6. (b)	7. (b)
8. (d)	9. (c)	10. (c)	11. (c)	12. (d)	13. (c)	14. (a)
15. (a)	16. (d)	17. (a)	18. (c)	19. (b)	20. (a)	21. (d)
22. (b)	23. (b)	24. (d)	25. (c)	26. (c)	27. (b)	28. (b)
29. (b)	30. (a)	31. (b)	32. (c)	33. (a)	34. (b)	35. (a)
36. (b)	37. (c)	38. (a)	39. (c)	40. (a)	41. (c)	42. (a)
43. (b)	44. (d)	45. (a)	46. (c)	47. (d)	48. (d)	49. (a)
50. (d)	51. (c)	52. (b)	53. (b)	54. (a)	55. (c)	56. (c)
57. (d)	58. (a)	59. (a)	60. (a)	61. (d)	62. (c)	63. (a)
64. (d)	65. (a)	66. (c)	67. (d)	68. (a)	69. (b)	70. (c)
71. (a)	72. (c)	73. (d)	74. (a)	75. (a)		