

GATE 2012 MOCK TEST

PREPARED BY ARUNANAND T A

E-mail: arunta007@gmail.com

CS: Computer Science and Engineering

Instructions

- Answer all questions. Q. 1-25 and Q. 56-60 carry 1 mark each. Q. 26-55 and Q. 61-65 carry 2 marks each. There will be $\frac{1}{3}$ of the allotted marks as NEGATIVE credit for all questions except Q. 53 and Q. 55.
- Skipping questions will fetch you ZERO credits to those questions.
- Further, Q. 53 will be evaluated only if Q. 52 is answered correctly (likewise, Q. 55 will be evaluated only if Q. 54 is answered correctly).
- Answers must be written in the Response Sheet provided.
- Use HB Pencil to bubble the answers in the Response Sheets.
- Total Time for the test is 180 Minutes. Total Marks: 100.

ALL THE BEST!!!

Q. No. 1 – 25 Carry One Mark Each

1. In mathematical logic, $P \rightarrow (Q \rightarrow R)$ is equivalent to:
(A) $(P \wedge Q) \rightarrow R$ (B) $(P \vee Q) \rightarrow R$
(C) $(P \vee Q) \rightarrow \neg R$ (D) $(P \wedge Q) \rightarrow \neg R$
2. Out of 2000 families with 4 children each, how many would you expect to have 1 or 2 girls?
(A) 750 (B) 1250
(C) 1875 (D) 625
3. A group $(G, *)$ is abelian, if order of the group is:
(A) 8 (B) 9
(C) 10 (D) 11

4. Starting from $x_0=1$, on solving the equation $x^3 + 3x - 7 = 0$ using the Newton-Raphson method gives x_1 as:
- (A) 0.5 (B) 1.406
(C) 1.5 (D) 2
5. The maximum number of distinct elements in a skew-symmetric matrix of order 10×10 is:
- (A) 89 (B) 90
(C) 91 (D) 100
6. The number of ways in which thirteen similar gold coins can be distributed among three persons such that each one gets at least two coins is:
- (A) 24 (B) 20
(C) 15 (D) 36
7. Consider the following statements:
- S_1 : If G has P points and $\delta(G) \geq (P-1)/2$, then G is connected.
 S_2 : If G is connected, then \bar{G} is not connected.
 S_3 : If G is not connected, then \bar{G} is connected.
 S_4 : A graph is bipartite if and only if all its cycles are even.
- Which of the above statements are TRUE?
- (A) S_1, S_2, S_4 (B) S_1, S_3, S_4
(C) S_1, S_2, S_3 (D) S_2, S_3, S_4
8. Which of the following improper integrals is divergent?
- (A) $\int_1^4 \frac{dx}{x(4-x)^{1/3}}$ (B) $\int_{-\infty}^0 e^x dx$
(C) $\int_0^1 \frac{1}{x^2} dx$ (D) $\int_2^5 \frac{dx}{x\sqrt{2-x}}$
9. Which of the following is equivalent expression to $A \oplus B \oplus C$:
- (A) $(A+B+C)(\bar{A} + \bar{B} + \bar{C})$ (B) $(A+B+C)(\bar{A} + \bar{B} + C)$
(C) $ABC + \bar{A}(B \oplus C) + \bar{B}(A \oplus C)$ (D) None of the above
10. If a disk system has 200 tracks with 1024 sectors per track. If the track capacity is 62500 bits and the angular rotation is 2400 rpm, what is the number of bytes/unit data transfer?

- (A) 8 bytes
(C) 16 bytes
- (B) 6 bytes
(D) 7812 bytes

11. What will be the output of the following C program module:

```
int i=50;  
printf("%d,%d,%d",i,++i,i++)
```

- (A) 50,51,52
(C) 51, 51, 50
- (B) 51,52,50
(D) 52,52,50

12. $T(n) = T(\lfloor n/2 \rfloor) + T(\lfloor n/2 \rfloor) + 1$ is:

- (A) $O(n)$
(C) $O(\lg n)$
- (B) $O(n \lg n)$
(D) $O(\lg \lg n)$

13. The minimal finite automate that accepts the language defined by $(0+1)^*(00+11)$ has:

- (A) 5 states
(C) 7 states
- (B) 6 states
(D) 8 states

14. The grammar

```
S → a  
A → a  
S → A
```

is:

- (A) LR (1)
(C) LR (0)
- (B) SLR (1)
(D) None of the above

15. In a paged memory, the page hit ratio is 0.35. The time required to access page in secondary memory is 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is:

- (A) 3 ns
(C) 68.5 ns
- (B) 68 ns
(D) 78.5 ns

16. What does the following SQL query return?

```
select E.eid  
from Employee E  
where E.salary = (select max (E2.salary)  
                  from Employee E2  
                  where E2.salary ≠ (select max (E3.salary)  
                                     from Employee E3)
```

- (A) *eids* of employees who has highest salary
(B) *eids* of employees who has second highest salary
(C) *eids* of employees who make third highest salary

- (D) an error message
17. Which of the following types of maintenances takes the maximum chunk of the total maintenance effort in a typical commercial application environment?
- (A) Adaptive Maintenance (B) Corrective Maintenance
(C) Preventive Maintenance (D) Perfective Maintenance
18. An organization has a Class C network with network ID as 195.100.102 and uses 255.255.255.135 as subnet mask. What's the lowest IP address possible in 128 subnet?
- (A) 195.102.100.136 (B) 195.102.100.129
(C) 195.100.102.136 (D) 195.100.102.129
19. HTML is a subset of:
- (A) SGM T (B) SGML
(C) SGMD (D) None of the above
20. A problem in NP is NP-Complete if:
- (A) it can be reduced to a 3-SAT problem in polynomial time
(B) the 3-SAT problem can be reduced to it in polynomial time
(C) it can be reduced to any other problem in NP in polynomial time
(D) some problem in NP can be reduced to it in polynomial time
21. The minimum number of T-gates required to implement the following function is:
- $$f(w,x,y,z) = \sum m(0,1,2,4,7,8,9,10,12,15)$$
- (A) 1 (B) 2
(C) 3 (D) 4
22. The following is an 8085 assembly language program. Predict the contents of HL pair after the execution of the program:
- ```
MVI B,6AH
MVI A,05H
LXI H,1C40H
CALL SUB
SUB: CMP M
RZ
DCR B
HLT
JNZ SUB
INX H
RET
```

- (A) 0001 1100 1100 1010 (B) 0100 1010 0001 1100  
 (C) 0001 0100 0100 1010 (D) 0001 1100 0100 1010

23. On comparing paging and segmentation:

- (A) Paging is faster (B) Segmentation is faster  
 (C) They can't be compared in terms of speed (D) None of the above

24. In SWP, what relation must **NOT** hold among the four window edges and the window size, if  $S_L$  and  $S_U$  are lower and upper edges of the sender's window and  $R_L$  and  $R_U$  are lower and upper edges of the receiver's window:

- (A)  $0 \leq S_U - S_L + 1 \leq W$  (B)  $0 \leq R_U - R_L + 1 \geq W$   
 (C)  $0 \leq R_U - R_L + 1 \leq W$  (D)  $0 \leq S_L \leq R_L$

25. In the ..... approach(es), devices are associated with logical primary memory addresses rather than having a specialized device addresses:

- (A) I/O mapped I/O (B) Distributed Mapped I/O  
 (C) Memory mapped I/O (D) Both (A) and (C)

### **Q. No. 26 – 55 Carry Two Marks Each**

26. All positive 4-digit numbers that can be formed with the digits 2,3,4,5 and 6 are written. What's the probability that a number selected from this list at random has at least two identical digits in it?

- (A) 13/25 (B) 101/125  
 (C) 12/25 (D) 1/5

27. In a meeting,  $m$  men and  $n$  women are to be seated in a row so that no two women sit together. If  $m > n$ , then the number of ways in which they can be seated is:

- (A)  $\frac{m! n!}{(m+n)!}$  (B)  $\frac{m!(m+1)!}{(m-n+1)!}$   
 (C)  $\frac{m! n!}{(m-n+1)!}$  (D)  $\frac{m! n!}{(m+n-1)!}$

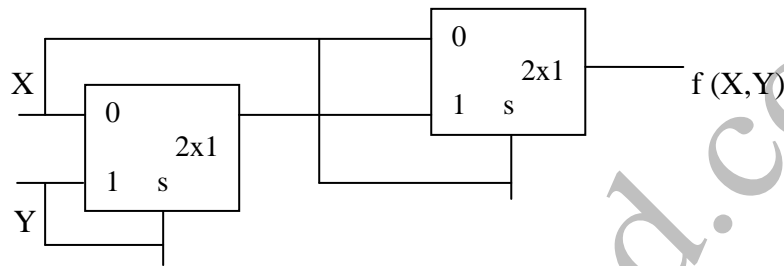
28. If -2 is an eigen value of the matrix  $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ , then the corresponding eigen vector is

- (A)  $(1 \quad -1 \quad 0)^T$  (B)  $(0 \quad 1 \quad -1)^T$   
 (C)  $(1 \quad 0 \quad -1)^T$  (D)  $(1 \quad -1 \quad 1)^T$

29. The girth of a graph is defined by the length of the shortest cycle in the graph. In any connected planar graph whose girth  $g$  is at least 3, which of the following is true?

- (A)  $|E| \leq \frac{g}{(g-2)} (|V| - 2)$  (B)  $|E| \leq \frac{g}{(g+2)} (|V| - 2)$   
 (C)  $|E| \leq \frac{g}{(g-2)} (|V| + 2)$  (D)  $|E| \leq \frac{g}{(g+2)} (|V| + 2)$

30. Give the value of  $f(X,Y)$  in the following arrangement:



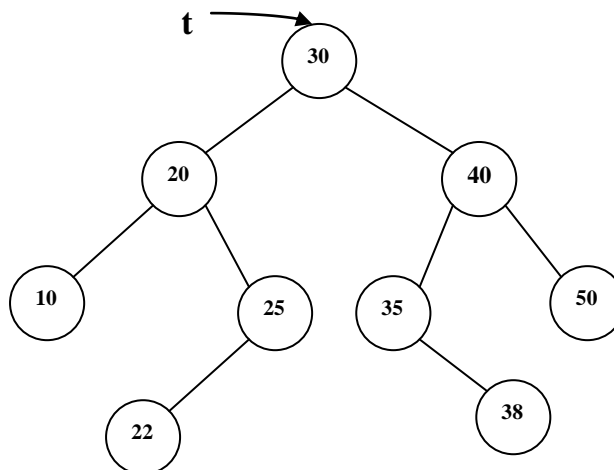
- (A) 1 (B) 0  
(C)  $X+Y$  (D)  $XY$

31. A block-set associative Cache consists of 128 blocks divided into four block sets. The main memory consists of 16,384 blocks and each block contains 256 eight-bit words. How many bits are needed to represent the TAG, SET and WORD fields respectively:

- (A) 8, 8, 8 (B) 6, 6, 6  
(C) 7, 8, 7 (D) 8, 6, 8

32. Consider the following variables in regard to the binary search tree shown:

- a: Inorder successor of  $t$  b: Inorder predecessor of  $t$   
 c: Smallest in left subtree of  $t$  d: Largest in right subtree of  $t$



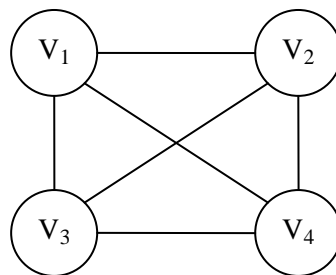
Which of the following is **TRUE** in the case of the values  $a$ ,  $b$ ,  $c$  and  $d$ ?

- (A)  $a < b < c < d$  (B)  $d > a > b > c$   
 (C)  $d > c > a > b$  (D)  $a > b > c > d$

33. Single source shortest path problems can be implemented by Greedy method using:

- (A) Red-Black Trees (B) Min Heap  
 (C) AVL Trees (D) Binary Search Trees

34. How many spanning trees are possible for the graph shown below:



- (A) 10 (B) 12  
 (C) 14 (D) 16

35. What does the following function do:

```

struct node* whatamidoing(struct node* a, struct node* b) {
 struct node* result;
 struct node* recur;
 if(a==NULL) return(b);
 else if(b==NULL) return(a);
 else {
 recur = whatamidoing(a->next,b->next);
 result=a;
 a->next=b;
 b->next=recur;
 return(result);
 }
}

```

- (A) Computes the intersection of two lists  
 (B) Computes the union of two lists  
 (C) Computes the difference of two lists  
 (D) Computes the list by considering a node alternately from each list

36. Consider the grammar:  $S \rightarrow aSbSaS \mid bSaSaS \mid aSaSbS \mid \epsilon$ .

It generates:

- (A) Twice as many  $a$ 's as  $b$ 's (B) More  $a$ 's than  $b$ 's

(C) More  $b$ 's than  $a$ 's(D) Unequal number of  $a$ 's and  $b$ 's

37. The activation record size can be known at:

(A) Compile Time

(B) Run Time

(C) Execution Time

(D) None of the above

38. Suppose the page table for the process currently executing looks like the following. All numbers are decimal, everything is numbered starting from zero, and all addresses are memory byte addresses. The page size is 1024 bytes.

| Virtual Page # | Valid Bit | Reference Bit | Modify Bit | Page Frame # |
|----------------|-----------|---------------|------------|--------------|
| 0              | 1         | 1             | 0          | 4            |
| 1              | 1         | 1             | 1          | 7            |
| 2              | 0         | 0             | 0          |              |
| 3              | 1         | 0             | 0          | 2            |
| 4              | 0         | 0             | 0          |              |
| 5              | 1         | 0             | 1          | 0            |

What physical address, if any, would each of the following Virtual addresses correspond to? (Do not try to handle page faults, if any)

i) 1052      ii) 2221      iii) 5499 respectively.

(A) 1052, 2221, 5499

(B) 7196, -, 379

(C) 7196, -, 5120

(D) -, 2221, -

39. Consider the following rules applied on a table:

- An employee may work in many departments
- Each employee has a unique employee number
- Each department has many managers
- An employee has only one manager for each department
- Each manager can manage only one department
- Each employee has only one Name

In which normal form is this table?

(A) 3 NF

(B) 2 NF

(C) 1 NF

(D) BCNF

40. Consider a 200 m, 4 Mbps token ring containing 20 stations each transmitting with equal priority. Suppose no station is allowed to transmit more than 5000 data octets before giving up the token. What is the transmission delay for the data packet?

(A) 10000  $\mu$ s(B) 1000  $\mu$ s



(C) 100  $\mu$ s(D) 10  $\mu$ s

41. Provide the best matching between the entries in the two columns given in the table below:

|                 |             |
|-----------------|-------------|
| I. Proxy Server | a. Firewall |
| II. KaZaA, DC++ | b. Caching  |
| III. SLIP       | c. P2P      |
| IV. DNS         | d. PPP      |

(A) I-a, II-d, III-c, IV-b

(B) I-b, II-d, III-c, IV-a

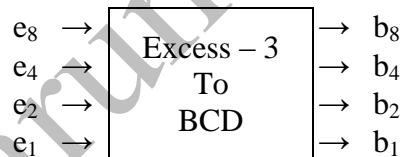
(C) I-a, II-c, III-d, IV-b

(D) I-b, II-c, III-d, IV-a

42. What is the condition for minimum frame size in Ethernet?

- (A) Transmission Delay = Propagation Delay  
 (B) Transmission Delay > 2 x Propagation Delay  
 (C) Transmission Delay = 2 x Propagation Delay  
 (D) Transmission Delay  $\neq$  Round Trip Delay

43. Given Excess – 3 to BCD converter.



Which of the following is the minimal POS form of the  $b_4$  output?

- (A)  $(e_1 + e_2)(e_4 + e_8)(e_4 + e_2 + e_1)$  (B)  $(e_1 + e_8)(e_2 + e_4)(e_4 + e_2 + e_1)$   
 (C)  $(e_1 + e_4)(e_2 + e_8)(e_4 + e_2 + e_1)$  (D) None of the above

44. Consider the following elements: 10, 100, 32, 45, 58, 126, 3, 29, 200, 400, 0. Let the hash table size be 13. Then, how many collisions will occur when these keys are first folded by adding their digits together and then reducing to modulo hash table size?

- (A) 5 (B) 4  
 (C) 3 (D) 2

45. Assume that the SLR(1) parser for a grammar has  $n_1$  states and the CLR(1) parser for the same has  $n_2$  states. Which of the following clearly depicts the relationship between  $n_1$  and  $n_2$ ?

- (A)  $n_1 < n_2$  (B)  $n_1 = n_2$

(C)  $n_1 > n_2$ 

(D) It depends on the grammar

46. What can be said about the following schedule:

| Step | $T_0$    | $T_1$    | $T_2$    |
|------|----------|----------|----------|
| 1    | Write(A) |          |          |
| 2    |          | Write(A) |          |
| 3    |          |          | Write(A) |
| 4    | Write(B) |          |          |
| 5    |          | Write(B) |          |

- (A) This schedule is allowed in Timestamp Protocol and in 2PL Protocol  
 (B) This schedule is allowed in Timestamp Protocol but not in 2PL Protocol  
 (C) This schedule is allowed neither in Timestamp Protocol nor in 2PL Protocol  
 (D) This schedule is not allowed in Timestamp Protocol but allowed in 2PL Protocol

47. A machine needs 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names would approximately be:

- (A) 6.7 sec (B) 50.2 sec  
 (C) 72.7 sec (D) 11.2 sec

### **Data for Common Data Questions Q. No. 48 & 49**

A system that uses a two-level page table has  $2^{12}$  - byte pages and 32-bit virtual addresses. The first 8-bits of the address serve as the index into the first level page table.

48. How many bits specify the second level index?

- (A) 10 (B) 12  
 (C) 14 (D) 16

49. How many pages are there in the virtual address?

- (A)  $2^{10}$  (B)  $2^{12}$   
 (C)  $2^{20}$  (D)  $2^{32}$

**Data for Common Data Questions Q. No. 50 & 51**

Consider the relation: Relation (A B C D E F). The Functional Dependencies are given as:

$A \rightarrow FC$

$C \rightarrow D$

$B \rightarrow E$

50. Which of the following is the key?

(A) AC

(B) AB

(C) BC

(D) DC

51. Find the 3NF relations?

(A) ACDF, BE, AB

(B) ACDF, BE, AB, CD

(C) CD, ACF, BE, AB

(D) None of these

**Statement for Linked Answer Questions Q. No. 52 & 53**

Consider the following 32-bit floating point representation scheme as shown in the format below. A value is specified by 3 fields, a one bit sign field (with 0 for positive and 1 for negative values), a 24-bit fraction field (with binary point being at the left end of the fraction bits) and a 7-bit exponent field (in excess-64 signed integer representation, with 16 being the base of exponentiation). The sign bit is the most significant bit.

|          |              |              |
|----------|--------------|--------------|
| ← 1 →    | ← 24 →       | ← 7 →        |
| Sign (S) | Fraction (F) | Exponent (E) |

52. It's required to represent the decimal value -7.5 as a normalized floating point number in the given format. What will be values of S, F and E?

(A) S = 1, F = 011010000... (up to 24 bits), E = 1000011

(B) S = 1, F = 011110000... (up to 24 bits), E = 1000001

(C) S = 1, F = 011010000... (up to 24 bits), E = 1000001

(D) S = 1, F = 011110000... (up to 24 bits), E = 1000011

53. Express the above answer in hexadecimal (32 bits)

(A) 1780008C

(B) ACDE0043

(C) BC000041

(D) BC000083

**Statement for Linked Answer Questions Q. No. 54 & 55**

Let  $L_1 = \{w \mid w \text{ has equal number of } \{a,b,c,d,e,f\}\}$

Let  $L_2 = \{wwwwwww \mid w \text{ in } \{a,b,c,d,e,f\}^*\}$

Let  $L_3 = \text{the set of all strings in } \{a,b,c,d,e,f\}^*$

54. Choose the correct statement:

(A)  $L_1 = L_3$ , but  $L_1 \neq L_2$

(B)  $L_1 = L_2 = L_3$

(C)  $L_2 = L_3$ , but  $L_1 \neq L_2$

(D)  $L_1 \neq L_2 \neq L_3$

55.  $L_1$ ,  $L_2$  and  $L_3$  are all:

(A) Regular and Finite

(B) CSL, but not finite

(C) CFL, but not regular

(D) Recursively Enumerable, but not CFL

**Q. No: 56-60 Carry One Mark Each**

56. Which of the following options is closest in meaning to the word *propensity*:

(A) characteristic

(B) quality

(C) tendency

(D) aptitude

57. Choose the most appropriate word from the options to complete the sentence given below:

*He was so ..... that he passed with high marks.*

(A) aristocratic

(B) industrious

(C) transient

(D) acrimonious

58. The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.

**PERENNIAL :: EPHEMERAL**

(A) Mature :: Ripe

(B) Diurnal :: Annual

(C) Majestic :: Mean

(D) Permanent :: Temporary

59. Identify in which module does the error, if any, lie in the sentence given below:

He is very polite / to his teachers and treats / them with great deference.  
I II III

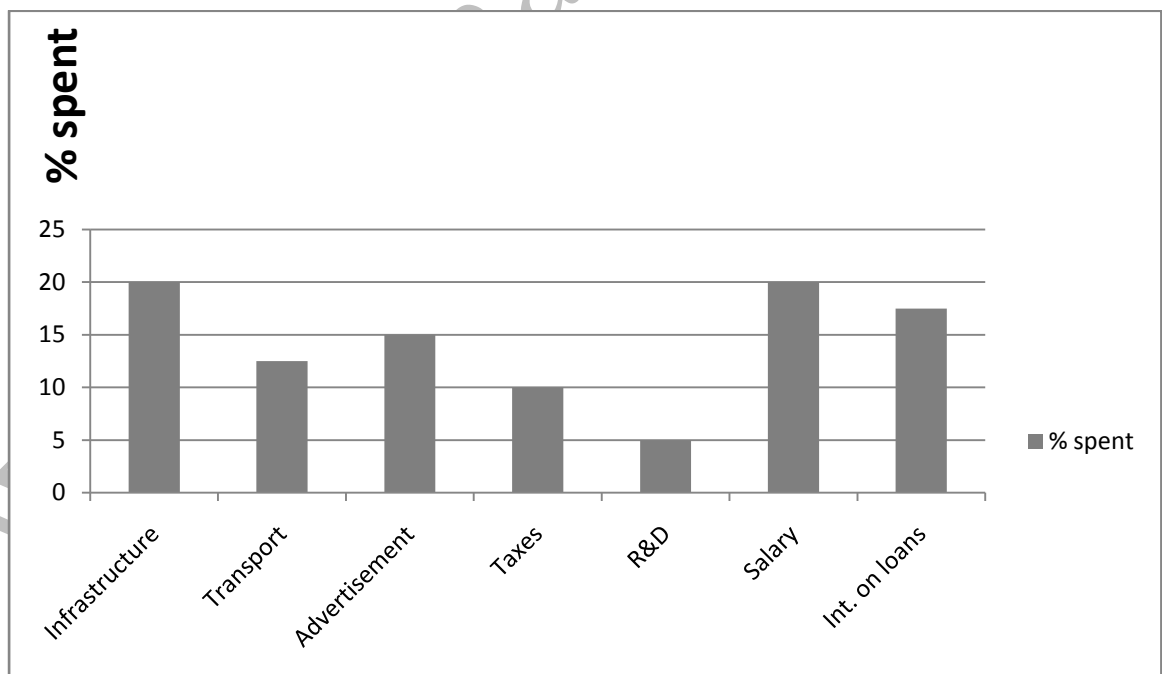
- (A) I (B) II  
(C) III (D) No Error

60. A pump can fill a tank with water in 2 hours. Because of a leak, it took  $2\frac{1}{3}$  hours to fill that tank. That leak can drain all the water in the fully filled tank in how many hours?

- (A)  $4\frac{1}{3}$  (B) 7  
(C) 8 (D) 14

**Q. No: 61-65 Carry Two Marks Each**

61. The bar graph given below shows the percentage distribution of total expenditures of a company under various expense heads during the year 2011.



If the expenditure on advertisement is ₹ 2.10 Crores, then the difference between the expenditures on transport and taxes is:

- (A) 1.25 Crores (B) 35 Lakhs  
(C) 65 Lakhs (D) 95 Lakhs
62. P can complete a work in 12 days by working 8 hours a day. Q can complete the same work in 8 days by working 10 hours a day. If both P and Q work together, 8 hours a day, in how many days can they complete that work?
- (A)  $5\frac{5}{11}$  (B)  $5\frac{6}{11}$   
(C)  $6\frac{5}{11}$  (D)  $6\frac{6}{11}$
63. Two trains, each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast as the other, then the speed of the faster train is
- (A) 30 kmph (B) 45 kmph  
(C) 60 kmph (D) Can't be determined
64. Rajan got married 8 years ago. His present age is  $\frac{6}{5}$  times his age at the time of his marriage. Rajan's sister was 10 years younger to him at the time of his marriage. What is the age of Rajan's sister now?
- (A) 32 years (B) 36 years  
(C) 38 years (D) 40 years
65. Read the passage given below and answer the question that follow:
- He walked several miles that day, but couldn't get anything to eat or drink except some dry bread and some water, which he got from cottagers and farmers. As night fell, he slept under a haystack lying in a meadow. He felt frightened at first, for the wind blew awfully over the empty fields. He felt cold and hungry, and was feeling more lonely than he had ever felt before. He, however, soon fell asleep, being much tired with his long walk. When he got up the next day, he was feeling terribly hungry. So he purchased a loaf of bread with a few coins that he had.*
- With reference to the passage above, he fell asleep because:
- (A) He was all alone (B) He was exhausted  
(C) He was very frightened (D) He was hungry

\*\*\*\*\*

For more GATE related information, visit:

<http://www.cecblog.com/?s=GATE>

<http://www.inspirenignite.com>

**Disclaimer:** Questions in this paper are set by referring to the question banks, previous question papers or are set by myself. Discrepancies in the questions or answers, if any, may be intimated at: [arunta007@gmail.com](mailto:arunta007@gmail.com)

**END OF THE PAPER**

[www.arunanand.com](http://www.arunanand.com)