

ST. ANTHONY'S COLLEGE, SHILLONG

ENTRANCE TEST FOR ADMISSION TO MASTER OF COMPUTER APPLICATIONS (MCA) 2007

DATE : **23 August 2007**
TIME : **11:00 am**
DURATION : **2½ hours**

INSTRUCTIONS

- ☞ This test has four modules. Module I (Logical Reasoning) and Module II (Numerical Aptitude) are compulsory for all candidates. Answer **either** Module III (Mathematics) **or** Module IV (Computer Science).
- ☞ Module I has 40 questions, carrying a total of 40 marks. These are multiple choice type questions, and you will have to select the correct option. THIS MODULE HAS NEGATIVE MARKING. 0.25 mark will be deducted for every wrong answer. The remaining modules DO NOT HAVE ANY NEGATIVE MARKING.
- ☞ Module II contains 15 questions of 2 marks each, of which only ten are to be answered.
- ☞ Module III contains 14 questions of 5 marks each, of which only 8 are to be answered.
- ☞ Module IV consists of 7 questions of 10 marks each, of which only 4 are to be answered.
- ☞ Make sure that you have entered your admit card number in the answer sheet.
- ☞ All questions are to be answered in the question paper itself, within the space provided for the same.
- ☞ All rough work is to be done in the space provided for it.
- ☞ Distribute your time among the three modules judiciously. You will have to pass in each of the modules.
- ☞ Please preserve your admit cards. They will be required at the time of admission.
- ☞ The list of those selected for admission based on the Entrance Examination will be published on the College notice boards on 24th August, 2007. The candidates will have to complete the admission formalities by 11:00 am 25th August, 2007.

Module I: Logical Reasoning

Directions for questions 1 and 2: Cross(×) the suitable word from the given alternatives so that words in both sides of :: have similar relationship.

1. Disease: Pathology :: Planet: ?
 Astronomy Astrology Geology Planetology
2. Video: Cassette :: Computer: ?
 Reels RAM Files Floppy

Directions for questions 3 and 4: Cross(×) the odd one

3. Mouse Keyboard Microphone Printer
4. Circle Ellipse Sphere Cube

Directions for questions 5 to 8: Complete the following series by placing a cross (×) against the right option.

5. 1, 2, 5, 12, 27, 58, 121, ?
 248 348 324 231
6. 13, 32, 24, 43, 35, ?, 46, 65, 57, 76
 45 52 54 55
7. 225, 336, 447, ?, 669, 7710
 114 338 558 991
8. 4, 9, 8, 27, 16, ?, 32, 243
 51 61 71 81
9. In a certain code *PEOPLE* is written as *PLPOEE*, how will *TREND* be written?
 TREDN DNERT NDETR TNERD
10. If *DIAMOND* is coded as *VQYMKLV*, how is *FEMALE* coded?
 TUMYNU UVNZOV UVNYNV TVNYNV
11. In a certain language *CHARCOAL* is coded as *45164913* and *MORALE* is coded as *296137*, how is *COACH* coded in that language?
 38137 49148 48246 49145

Directions for questions 12 and 13: In a certain code “*il be pee*” means “*roses are blue*”; “*sik hee*” means “*red flowers*” and “*pee mit hee*” means “*flowers are vegetables*”.

12. How is “red” written in that code?
 hee sik be can't be determined
13. How is “roses” written in that code?
 il pee be can't be determined

Directions for questions 14 and 15: A is the father of C, but C is not his son. E is the daughter of C. F is the spouse of A. B is brother of C. D is the son of B. G is the spouse of B. H is the father of G.

14. Who is the grandmother of D?
 A C F H

SPACE FOR ROUGH WORK

15. Who is the son of F?

B

C

D

E

Directions for questions 16 to 18: A+B means A is the father of B, A-B means A is the wife of B, A×B means A is the brother of B and A*B means A is the daughter of B.

16. Given P * R+S+Q, which of the following statements is true?

P is the daughter of Q

Q is the aunt of P

P is the aunt of Q

P is the mother of Q

17. Given P-R+Q, which of the following statements is true?

P is the mother of Q

Q is the daughter of P

P is the aunt of Q

P is the sister of Q

18. Given P x R * Q, which of the following statements is true?

P is the uncle of Q

P is the father of Q

P is the brother of Q

P is the son of Q

Directions for questions 19 to 21: Madhu and Sobha are good in Dramatics and Computer Science. Anjali and Madhu are good in Computer Science and Physics. Anjali, Poonam and Nisha are good in Physics and History. Nisha and Anjali are good in Physics and Mathematics. Poonam and Sobha are good in History and Dramatics.

19. Who is good in Computer Science, History and Dramatics ?

Anjali

Madhu

Sobha

Nisha

20. Who is good in Physics, Dramatics and Computer Science?

Shoba

Poonam

Madhu

Anjali

21. Who is good in Physics, History and Dramatics?

Poonam

Sobha

Madhu

Anjali

Directions for questions 22 and 23: There are five friends. They are standing in a row facing South. Jayesh is to the immediate right of Alok. Pramod is between Bhagat and Subodh. Subhod is between Jayesh and Pramod.

22. Who is at the extreme left end?

Alok

Bhagat

Subodh

Data insufficient

23. Who is in the middle?

Bhagat

Jayesh

Pramod

Subodh

Directions for questions 24 to 26: A, B, C, D and E are five friends. B is older than E, but not as tall as C. C is younger than A, and is taller than D and E. A is taller than D, but younger than E. D is older than A, but is the shortest in the group.

24. Who among the following is the oldest?

A

B

Either B or D

None of these

25. Which of the following pairs of students is older than D?

BA

BC

BE

None of these

26. If another friend F is taller than C, how many of them will be between F and E according to their height?

One

Insufficient data

Four

None of these

SPACE FOR ROUGH WORK

27. If the following words are arranged as they would appear in a Telephone Directory, which one will appear third?
 Avdesh Avadhesh Awadesh Awdhesh
28. In the English alphabet series, which letter is eighth to the left of the sixteenth letter from the right end?
 B S C H
29. If the English alphabet series is written in reverse order, which letter will be the fifth to the left of the fourteenth letter from the left?
 R I S H
30. Reena is twice as old as Sunita. Three years ago, she was three times as old as Sunita. How old is Reena now?
 6 years 7 years 8 years 12 years

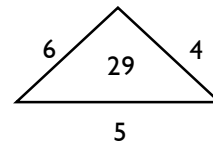
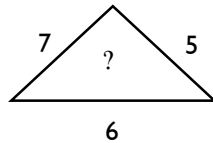
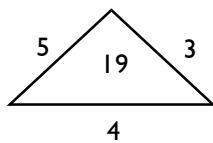
Direction for questions 31 to 33: Data on 450 candidates, who took examinations in Social Sciences, Mathematics and Science, is given below.

Number of students passed in all subjects:	167
Number of students failed in all the subjects:	60
Number of students failed in Social Sciences:	175
Number of students failed in Mathematics:	199
Number of students failed in Science:	191
Number of students passed in Social Science only:	62
Number of students passed in Mathematics only:	48
Number of students passed in Science only:	52

31. How many failed in Social Sciences only?
 15 21 30 42
32. How many failed in one subject only?
 152 144 61 56
33. How many passed in Mathematics and at least one more subject?
 210 203 170 94

Directions for questions 34 and 35: Cross (x) the missing character from the given alternatives.

34.



- 41 34 51 31

SPACE FOR ROUGH WORK

35.

6	18	15
3	2	5
4	3	?
8	27	9

4

5

3

6

36. A priest said to a devotee, " The temple bell is rung at regular intervals of 45 minutes. The last bell was rung five minutes ago. The next bell will be rung at 7:45 am. " At what time did the priest give this information to the devotee?

7:40 am

7:05 am

7:00 am

6:55 am

37. If + means /, - means x, / means +, x means -, then $36 \times 12 + 4 / 6 + 2 - 3 = ?$

2

18

42

6.5

38. There are 10 people at a conference. At the end of the conference they shake hands with each other. How many handshakes will be there altogether?

20

45

55

90

39. In the word "DISTURBANCE", the first letter is interchanged with the last letter, the second letter is interchanged with the tenth letter and so on. Which letter would come after the letter "T" in the newly formed word?

I

N

S

T

40. Manisha ranked 16th from the top and 29th from the bottom among those who passed an examination. 6 boys did not participate and 5 failed in it. How many boys were there in the class?

40

44

50

55

SPACE FOR ROUGH WORK

Module II: Numerical Aptitude

(Each question in this module carries 2 marks. Answer any TEN questions from this module.)

41. In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one of these two drinks. How many people like both coffee and tea?
42. If $A = \{a, b, c\}$ and $B = \{1, 2\}$ write down the elements of the Cartesian product of A and B.
43. Find the domain of the function defined by $f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$
44. Prove that $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$
45. If in a rectangle, the length is increased and the breadth is reduced each by 2 units, the area is reduced by 28 square units. If however, the length is reduced by 1 unit and the breadth is increased by 2 units, the area increases by 33 square units. Find the area of the rectangle.
46. Express $3(7+7i) + i(7+7i)$ in the form $a+ib$.
47. Find the values of x for which following inequality holds: $2 \leq 3x - 4 \leq 5$.
48. How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5 if repetition of digits is not allowed?
49. For what values of x are $-2/7$, x , $-7/2$ in GP?
50. What are irrational numbers? Give an example of two irrational numbers whose product and sum are rational.
51. A vertical post is broken at a point 10 ft. above the ground and the other end falls to the ground without the pole being detached at the broken end. If the end which touches the ground makes an angle of 30° with the ground, find the total length of the pole.
52. Do the points $(1,2,-1)$, $(1,2,1)$ and $(2,3,2)$ lie on a straight line? Justify your answer.
53. Does the point $(-2.5, 3.5)$ lie inside, outside or on the circle $x^2 + y^2 = 25$?
54. In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing at least one of them is 0.95. What is the probability of passing both?
55. If $f(x) = kx^2 + 7x - 4$ and $f'(5) = 97$, find k .

ANSWER MODULE II HERE

ANSWER **MODULE II** HERE

SPACE FOR ROUGH WORK

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SPACE FOR ROUGH WORK

ANSWER **MODULE II** HERE

SPACE FOR ROUGH WORK

Module III: Mathematics

(You can either answer this module or Module IV. Each question in this module carries 5 marks. Answer any EIGHT questions from this module.)

56. Find the solutions of the equation $\tan x = -\frac{1}{\sqrt{3}}$ lying between 0 and 2π .
57. Solve $2 \cos^2 x + 3 \sin x = 0$
58. Evaluate $\left[i^{18} + \left(\frac{1}{i} \right)^{25} \right]^3$ where $i^2 = -1$.
59. The longest side of a rectangle is 3 times the shortest side and the third side is 2 cm shorter than the longest side. If the perimeter of the triangle is at least 61 cm, find the minimum length of the shortest side.
60. Find n if ${}^{n-1}P_3 : {}^n P_4 = 1 : 9$
61. How many words with or without meaning, each of 2 vowels and 3 consonants can be formed from the letters of the word DAUGHTER?
62. Find the sum of $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{20.21}$
63. Suppose $f(x) = \begin{cases} a+bx, & x < 1 \\ 4 & x = 1 \\ b-ax & x > 1 \end{cases}$ and $\lim_{x \rightarrow 1} f(x) = f(1)$, what are the possible values of a and b?
64. Three letters addressed to three different people are placed into 3 envelopes addressed to them in a random manner. What is the probability that at least one letter is in its proper envelope?
65. A two digit number is 4 times the sum and 3 times the product of its digits. Find the number.
66. The radius of a circle is increasing uniformly at the rate of 3 cm per second. Find the rate at which the area is increasing when the radius is 10 cm.
67. If $y = \log \tan \left(\frac{\pi}{4} + \frac{x}{2} \right)$, find $\frac{dy}{dx}$
68. Integrate $\int x \log x dx$
69. A company has produced x items and the total cost C and total revenue R are given by the equations $C = 100 + 0.015x^2$ and $R = 3x$. Find how many items should be produced to maximize the profit. What is this profit?

Module IV: Computer Science

(You can either answer Module III or this module. Each question in this module carries 10 marks. Answer any FOUR questions from this module.)

(The functions / programs may be written in **Pascal, C, C++ or Java**)

70. Write a program that reads an integer and prints how many digits in the integer are 7s.
71. Write a C function that returns the value of the expression x^y where x and y are positive integers and parameters to the function. Suggest the modifications required if x and/or y are real numbers.
72. An integer is said to be a *perfect number* if its factors, including 1 (but not the number itself), sum to the number. For example, 6 is a perfect number because $6 = 1 + 2 + 3$. Write a function **perfect** that determines if parameter **number** is a perfect number. Use this function in a program that determines and prints all the perfect numbers between 1 and 1000. Print the factors of each perfect number to confirm that the number is indeed perfect.

73. Write a recursive function **power(base, exponent)** that when invoked returns $\text{base}^{\text{exponent}}$.

Assume that **exponent** is an integer greater than or equal to 1.

74. The *Sieve of Erasthothenes*: A prime integer is any integer that can be divided, without remainder, only by itself and 1. The Sieve of Erasthothenes is a method of finding prime numbers. It works as follows:
- Create an array with all elements initialized to 1 (true). Array elements whose subscripts are prime will retain the value 1. All other elements will eventually be set to zero.
 - Starting with array subscript 2 (subscript 1 must be prime), every time an array element is found whose value is 1, loop through the remainder of the array and set to zero every element whose subscript is a multiple of the subscript for the element with value 1. For array subscript 2, all elements beyond 2 in the array that are multiples of 2 will be set to zero (subscripts 4, 6, 8, 10, etc.) For array subscript 3, all elements beyond 3 in the array that are multiples of 3 will be set to zero (subscripts 6, 9, 12, 15, etc.)

When this process is complete, the array elements that are still set to 1 indicates that the subscript is a prime number. These subscripts can then be printed. Write a program that uses an array of 1000 elements to determine and print the prime numbers between 1 and 999. Ignore element with subscript 0.

75. Write the algorithm to create a linked list of integers so that the list is always sorted in ascending order.

76. Find the error (logical or syntactical) in each of the following program segments. If the error can be corrected, explain how.

a)

```
while ( z > 0)    /* assume z has value 100 */
    sum += z;
```

b)

```
if ( x > 7 ) ;    /* assume x is integer */
    printf( "\n x is greater than 7");
```

c)

```
int *number;
printf( "%d\n", *number);
```

d)

```
float *realPtr;
long *integerPtr;
integerPtr = realPtr;
```

e)

```
int *x, y;
x = y;
```

f)

```
char s[] = "this is a character array";
int count;
for ( ; *s != '\0'; s++)
    printf("%c", *s);
```

g)

```
short *numPtr, result;
void *genericPtr = numPtr;
result = *genericPtr + 7;
```

h)

```
float x = 19.34;
float xPtr = &x;
printf( "%f\n", xPtr);
```

i)

```
char *s;
printf( "%s\n", s);
```

j)

```
int p = 5, *pi = &p;
printf("p+1 = %d", *++pi);
```

ANSWER **MODULE III** OR **MODULE IV** HERE

SPACE FOR ROUGH WORK

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