ST. ANTHONY'S COLLEGE SHILLONG

ENTRANCE TEST FOR ADMISSION INTO
UNDER GRADUATE
PROFESSIONAL COURSES
2010

COMPUTER SCIENCE

DATE :   THURSDAY, 6TH MAY, 2010
TIME :   2:30 – 4:30 PM
DURATION: 2 HOURS

INSTRUCTIONS

- This test has two parts. Part A and Part B.
- **Part A** has a total of **16** questions. All questions are of equal marks. However, there will be **Negative Marking** of 0.25 for every wrong answer.
- **Part B** has a total of **15** questions. These questions are to be answered on the question paper itself, in the space provided. There will be **NO NEGATIVE MARKING** for this part.
- For each question you may select only **ONE** answer. Selecting more than one option qualifies as a wrong answer. You can use a pen/pencil for answering the questions.
- Write the **Roll Number** given on your Admit Card in the answer sheet and question paper in the space provided.
- **Please preserve your Admit Card**. It will be required at the time of admission.
- The Admit Card numbers of those shortlisted for admission on the basis of this Entrance Test will be published on the College Notice Boards as well as on the College Web Site on Monday, 10th May, 2010.
- The final admission will be done on a first come, first served basis, after the marksheets of the Class XII examinations of the Meghalaya Board of School Education are available, provided the eligibility criteria as laid down in the prospectus are fulfilled. Shorlisted students from other boards and streams whose Class XII results are declared later will also be considered for admission provided they report not later than 2 days after the result declaration of their respective board examinations along with their marksheets (Original or Downloaded).

ADMIT CARD NO. _____

Invigilators Signature: _____

Directions for questions 1 – 16:

Select the correct answer by marking ☒, to indicate your choice. Please note that there will be NEGATIVE MARKING of 0.25 for every wrong answer.

1. The value of $\sin^{-1} x + \cos^{-1} x$ is:
   a. 0 ☐
   b. 1 ☐
   c. $\Pi/2$ ☐
   d. $\Pi/4$ ☐

2. If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $A^2 = 8A + KI$, then K is equal to:

   a. -3 ☐
   b. -4 ☐
   c. -7 ☐
   d. 7 ☐

3. The derivative of $e^{\cot x}$ with respect to x is:
   a. $-e^{\cot x} \csc^2 x$ ☐
   b. $e^{\cot x} \csc^2 x$ ☐
   c. $e^{\cot x} \sin^2 x$ ☐
   d. $-e^{\cot x} \sin^2 x$ ☐

4. The value of $\int \sec x \, dx$ is:
   a. $\log |\sec x|$ ☐
   b. $\log |\sec x + \tan x|$ ☐
   c. $\log |\tan x|$ ☐
   d. 0 ☐

5. The direction cosines of the vector $2\hat{i} + \hat{j} - 2\hat{k}$ are:

   a. $\dfrac{2}{3}, \dfrac{1}{3}, \dfrac{-2}{3}$ ☐
   b. $\dfrac{1}{3}, \dfrac{-1}{3}, \dfrac{1}{3}$ ☐

   c. $\dfrac{2}{3}, \dfrac{-2}{3}, \dfrac{-2}{3}$ ☐
   d. $\dfrac{1}{3}, \dfrac{1}{3}, \dfrac{1}{3}$ ☐

6. Let E_1 and E_2 be events such that $P(E_1) = 0.3$, $P(E_1 \cup E_2) = 0.4$ and $P(E_2) = x$ and if E_1 and E_2 are mutually exclusive events, then x is equal to:
   a. 0.2 ☐
   b. 0.1 ☐
   c. 0.3 ☐
   d. 0.4 ☐

SPACE FOR ROUGH WORK BELOW:

7.   Let R = {(1,1), (2,2), (1,2), (2,1)} be a relation on set A = {1,2,3}, then the relation R is:
      a.   reflexive   ☐   b.   symmetric   ☐
      c.   anti-symmetric   ☐   d.   none of these   ☐

8.   The operation * on Z^+, the set of positive integers defined by a * b = |a - b|, is a:
      a.   binary operation   ☐   b.   commutative operation   ☐
      c.   not binary operation ☐   d.   none of these   ☐

9.   The value of $\int_{0}^{\Pi/6} \sec^2 x \ dx$ is:

      a. $\dfrac{1}{\sqrt{3}}$ ☐   b. $\dfrac{1}{3}$ ☐

      c. $\dfrac{2}{\sqrt{3}}$ ☐   d. $\dfrac{-2}{\sqrt{3}}$ ☐

10.   The maximum value of f(x) = x + sin 2x on [0, 2Π] is:
      a. $\Pi/2$ ☐   b. Π ☐
      c. 2Π ☐   d. 3Π ☐

11.   The inverse of the matrix $\begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ is:

      a. $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ ☐   b. $\begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}$ ☐

      c. $\begin{bmatrix} 5 & 3 \\ 1 & 2 \end{bmatrix}$ ☐   d. $\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$ ☐

SPACE FOR ROUGH WORK BELOW:

12. The value of $\dfrac{dy}{dx}$, when x = a (t + sin t) and y = a (1 – cos t) is:

   a. $\tan \dfrac{t}{2}$ ☐

   b. $\tan t$ ☐

   c. $\cot \dfrac{t}{2}$ ☐

   d. $\cot t$ ☐

13. The solution of the differential equation $\log \dfrac{dy}{dx} = ax + by$ is:

   a. $ae^{-by} + be^{ax} = c$ ☐

   b. $ae^{ax} + be^{-by} = c$ ☐

   c. $ae^{-ax} + be^{by} = c$ ☐

   d. none of these ☐

14. The angle between the vectors $\left(\bar{a} + \bar{b}\right)$ and $\left(\bar{a} - \bar{b}\right)$, if $\bar{a} = 2\hat{i} - \hat{j} + 3\hat{k}$ and $\bar{b} = 3\hat{i} + \hat{j} - 2\hat{k}$ is:

   a. Π ☐

   b. $\Pi/2$ ☐

   c. $\Pi/4$ ☐

   d. $\Pi/6$ ☐

15. The vector equation of a plane which is at a distance of 7 units from the origin and which is normal to the vector $\hat{i} + 2\hat{j} - 2\hat{k}$ is:

   a. $\bar{r}.(\hat{i} + 2\hat{j} - 2\hat{k}) = 21$ ☐

   b. $\bar{r}.(\hat{i} - 2\hat{j} - 2\hat{k}) = 7$ ☐

   c. $\bar{r}.(\hat{i} + \hat{j} + 2\hat{k}) = 21$ ☐

   d. none of these ☐

16. In a game, 3 coins are tossed. A person is paid Rs. 5 if he gets all heads or all tails, and he is supposed to pay Rs. 3, if he gets one head or two heads. Then his expected gain on an average per game is

   a. Re. -1 ☐

   b. Re. 1 ☐

   c. Rs. 2 ☐

   d. Rs. -2 ☐

SPACE FOR ROUGH WORK BELOW:

Directions for questions 1 – 15:
Write the steps to arrive at the correct answer to the following questions in the space provided for each. Each correct complete answer will carry 4 marks. There is no NEGATIVE MARKING for this part.

1. Five boys are standing such that they form a circle. Ajay is between Ramesh and Dominic, Solomon is to the left of Babu. Ramesh is to the left of Solomon. Who is to the right of Ajay?

2. If – means x, x means +, + means ÷ and ÷ means -, then what will be value of 40 x 12 + 3 – 6 ÷ 60?

3. What is the missing number?

9	5	6
5	7	?
3	4	5
135	140	150

4. In a certain language, 'hupa chip fu pa' stands for the statement 'Ram is very intelligent'. 'Chip hupa kupa tik' for 'Hari is very smart'. 'Luk fu hupa' for 'Boy is intelligent'. 'fu tik dop' for 'smart and intelligent'. What word stands for 'Hari'?

Directions for the following questions 5 and 6:
Read the following information and answer the questions given below it:
Eleven friends named as A, B, C, D, E, F, G, H, I, J and K are sitting in the first row of the movie hall. All of them sit only in a single row facing the movie screen. D is to the immediate left of F. D is also second to the right of C. A is second to the right of E; and E is at one of the extreme ends. J is the immediate neighbor of A and B; J is also third to the left of G. H is at the immediate left of D. And H is also third to the right of I. Draw a diagram to depict the Seating Arrangement. Marks will be awarded for this diagram.

5. Who are at the two extreme ends viz. extreme left and extreme right?

6. Who are the groups of friends sitting to the right of G?

7. Consider the following symbols: #, $, *, / and @. If we assume that these symbols are the operators used for addition, subtraction, multiplication, division and equal to, then, perform the following calculation step-wise and equate the final results for X and Z.
   Step 1: P @ 22 $ 6
   Step 2: Q @ 2 * (P # 4)
   Step 3: X @ (Q / 2) + (P # 2)
   Step 4: Z @ ((2 * X) $ P) * 3

Directions for questions 8:
If A += 1 means A = A + 1 and A -= 1 means A = A – 1, calculate the following mathematical relationship step-wise and find the final values of M and N. Consider that initially M = 5 and N = 10 and for the rest of the steps take into account the calculated values of M and N of the previous step.
   Step 1: M += 7
   Step 2: N -= 8
   Step 3: M = M + N
   Step 4: N = M – N
8. What are the new values of M and N?

9. Repeat the following three steps two times and find the final values of P and Q. Consider that initially P = 4 and Q = 4 and for the rest of the steps take into account the calculated values of P and Q of the previous step.
   Step 1: P = P + 4
   Step 2: Q = (P X 3) - Q
   Step 3: P = Q – P

In the following diagram there are three interlocking circles, I, S and P where circle I stands for Indians, S for Scientists and P for Politicians. Different regions of the figure are lettered from *a* to *g*.
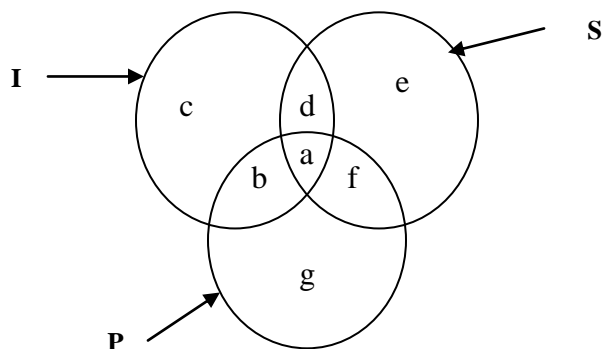
10. Which Region represents Indians who are Politicians but not Scientists?

11. Which Region represents Scientists who are Indians but not Politicians?

12. If *cook* is called *butler*, *butler* is called *manager*, *manager* is called *teacher*, *teacher* is called *clerk* and *clerk* is called *principal*, who will teach in a class?

Directions for questions 13 and 14:
A blacksmith has five iron articles A, B, C, D and E, each having different weights.
      i) A weighs twice as much as B.
      ii) B weighs four and half times as much as C.
      iii) C weighs half as much as D.
      iv) D weighs half as much as E.
      v) E weighs less than A but more than C.

13. Which of the articles is the lightest in weight?

14. E is lighter in weight than which of two other articles?

15. Repeat the following two steps *three times* and find the final values of A and B. Consider that initially A = 10 and B = 7 and for the rest of the steps take into account the calculated values of A and B of the previous step.
        Step 1: If A is less then 10, then A = A + 1; otherwise A = A - 3
        Step 2: If B is greater than 7, then B = B – 1; otherwise B = B + 3