

Admission Test for 1st Year B.Sc. Computer Science Honours – 2008
St. Xavier's College (Autonomous)
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Kolkata – 700016

FORMAT OF THE ADMISSION TEST

Total time : 1½ hours.

Total number of Questions = 50

Topic	No. of questions
A. Reading Comprehension	10
B. Understanding Relationships & Logical Reasoning	30
C. Problem solving : Mathematics	10

INSTRUCTIONS :

1. Do not open this Test Booklet until you are asked to do so.
2. All questions are compulsory.
3. Use of calculator, log table, slide rule, mobile phones etc. are not allowed.
4. The Test Booklet contains 50 multiple choice questions and a separate Answer Sheet. Answers should be marked only on the Answer Sheet.
5. Use fountain pen or ball pen to write on the Answer Sheet.
6. Do not write anything on the Test Booklet.
7. You may do your rough work or calculations in the blank sheets provided at the end of the Test Booklet.
- 8. Each question carries equal marks. For each correct answer 2 (two) marks are awarded. For an incorrect answer 1 (one) mark will be deducted. No marks are deducted for un-attempted question.**
9. Do not leave the Examination Hall unless specifically instructed.
10. The Test Booklet should not be taken outside the Examination Hall under any circumstances during or after the Examination.
11. Submit the Test Booklet along with your Answer Sheet at the end of the Examination.

ANSWERING PROCEDURE

Each question has 4 alternative answers, viz. A, B, C & D. Pick up the most appropriate answer and write the correct alternative corresponding to the given question.

Example :

31. A man bought a toy for Rs. 112 and sold it for Rs. 164. What fraction of the selling price was his profit ?

- (A) 26/64 (B) 13/35 (C) 13/28 (D) 13/41

The correct answer for the above question is 13/41. Therefore, you are required to write D in the Answer Sheet against Question No. 31 in the appropriate box.

Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
1.		11.		21.		31.	D	41.	

If you decide to change your answer, you must cross it out, and write your answer next to it in the same box.

A. Reading Comprehension : Read the passage given below and answer questions from 1 to 10.

The atmosphere is a mixture of several gases. There are about ten chemical elements which remain permanently in gaseous form in the atmosphere under all natural conditions. Of these permanent gases, oxygen makes up about 21 per cent and nitrogen about 78 per cent. Several other gases, such as argon, carbon dioxide, hydrogen, neon, krypton, and xenon, comprise the remaining 1 per cent of the volume of dry air. The amount of water vapour, and its variations in amount and distribution, are of extraordinary importance in weather changes. Atmospheric gases hold in suspension great quantities of dust, pollen, smoke, and other impurities which are always present in considerable, but variable amounts.

The atmosphere has no definite upper limits but gradually thins until it becomes imperceptible. Until recently it was assumed that the air above the first few miles gradually grew thinner and colder at a constant rate. It was also assumed that upper air had little influence on weather changes. Recent studies of the upper atmosphere, currently being conducted by earth satellites and missile probing, have shown these assumptions to be incorrect. The atmosphere has three well-defined strata.

The layer of the air next to the earth, which extends upward for about 10 miles, is known as the troposphere. On the whole, it makes up about 75 per cent of all the weight of the atmosphere. It is the warmest part of the atmosphere because most of the solar radiation is absorbed by the earth's surface, which warms the air immediately surrounding it. A steady decrease of temperature with increasing elevation is a most striking characteristic. The upper layers are colder because of their greater distance from the earth's surface and rapid radiation of heat into space. The temperatures within the troposphere decrease about 3.5 degrees per 1,000 feet increase in altitude. Within the troposphere, winds and air currents distribute heat and moisture. Strong winds, called jet streams, are located at the upper levels of the troposphere. These jet streams are both complex and widespread in occurrence. They normally show a wave shaped pattern and move from west to east at velocities of 150 mph, but velocities as high as 400 mph have been noted. The influences of changing locations and strengths of jet streams upon weather conditions and patterns are no doubt considerable. Current intensive research may eventually reveal their true significance.

Above the troposphere to a height of about 50 miles is a zone called the stratosphere. The stratosphere is separated from the troposphere by a zone of uniform temperatures called the tropopause. Within the lower portions of the stratosphere is a layer of ozone gases which filters out most of the ultraviolet rays from the sun. The ozone layer varies with air pressure. If this zone were not there, the full blast of the sun's ultraviolet light would burn our skins, blind our eyes, and eventually result in our destruction. Within the stratosphere the temperature and atmospheric composition are relatively uniform.

The layer upward of about 50 mile is the most fascinating but the least known of these three strata. It is called the ionosphere because it consists of electrically charged particles called ions, thrown from the sun. The northern lights (aurora borealis) originate within this highly charged portion of the atmosphere. Its effect upon weather conditions, if any, is as yet unknown.

1. Which of the following titles best summarizes the contents of the passage?
(A) New Methods for Calculating the Composition of the Atmosphere
(B) New Evidence Concerning the Stratification of the Atmosphere
(C) The Atmosphere : Its nature and Importance to our Weather
(D) The Underlying Causes of Atmospheric Turbulence
2. The passage supplied information that would answer which of the following questions?
 - i. How do the troposphere and the stratosphere differ?
 - ii. How does the ionosphere affect the weather?
 - iii. How do earth satellites study the atmosphere?(A) I only
(B) III only
(C) I and II only
(D) I and III only
3. According to the passage, life as we know it exists on the earth because the atmosphere
(A) contains a layer of ozone gases
(B) contains electrically charged particles
(C) is warmest at the bottom
(D) carries the ultraviolet rays of the sun
4. It can be inferred from the passage that at the top of Jungfrau, which is 12,000 feet above the town of Interlaken in Switzerland, the temperature is usually
(A) below freezing point
(B) about 42 degrees colder than in Interlaken
(C) affect by the ionosphere
(D) about 75 degrees colder than in Interlaken
5. The passage states that the troposphere is the warmest part of the atmosphere because it
(A) is closest to the sun
(B) contains electrically charged particles
(C) radiates heat into space
(D) is warmed by the earth's heat

6. According to the passage, the atmosphere consists of all of the following except
- (A) 21 per cent oxygen (C) ten permanent elements
(B) a definite amount of waste products (D) less than 1 per cent of xenon
7. Find the incorrect statement.
- (A) In stratosphere the temperature decreases with increase in altitude
(B) Stratosphere does not contain wind
(C) Tropopause lies between Troposphere and Stratosphere and contain uniform temperature
(D) Impurities are of importance in weather changes
8. According to the passage aurora borealis
- (A) Originate within the ionosphere
(B) Affects the weather conditions considerably
(C) May or may not affect the weather condition
(D) Is thrown from the sun
9. Find the incorrect statement
- (A) The ozone layer protects us from destruction
(B) The ozone layer is within the stratosphere
(C) The whole of stratosphere is made up of ozone gases
(D) The atmospheric condition are relatively uniform above the stratosphere to a height of about 50 miles
10. The word imperceptible in paragraph 2 means
- (A) invisible (C) faint
(B) unrevealed (D) undetectable

B. Understanding Relationships & Logical Reasoning

Directions for (Questions 11 – 13) Consider the following information.

Eight adjacent offices completely enclose a circular central courtyard. The offices are numbered consecutively, beginning at one of the offices with 1 and proceeding clockwise to 8. Eight junior executives – J, K, L, M, N, O, P and R – are to occupy the offices, one to an office. The assignment of offices is subject to the following restrictions:

- i. J is allowed first choice of any of the offices.
 - ii. K and P must be assigned to adjacent offices.
 - iii. L and P must be assigned to adjacent offices.
 - iv. M and O must be assigned to adjacent offices.
 - v. M and N cannot be assigned to adjacent offices.
 - vi. O is assigned to office 2 unless J chooses it; in that case, O will be assigned to office 3
 - vii. K is assigned to office 7 unless J chooses it; in that case, K will be assigned to office 5.
11. Which of the following is an assignment of executives to offices, beginning with office 1 and proceeding consecutively to office 8, that conforms to the restrictions above?
- (A) J, O, M, R, L, P, K, N (C) M, O, N, K, P, L, R, J
(B) J, R, O, M, L, P, K, N (D) M, C, R, J, L, K, P, N
12. P could be assigned to which of the following offices?
- (A) 1 (C) 3
(B) 2 (D) 4
13. If N is assigned to office 5, which of the following can be true?
- (A) M is assigned to office 4 (C) P is assigned to office 1
(B) O is assigned to office 3 (D) R is assigned to office 6

Directions for (Questions 14 – 16). Consider the following information.

The membership of two committees, designated X and Y, must be drawn exclusively from a group of seven people : F, G, H, I, J, K and L.

- i. Each of the seven people must serve on X or Y.
 - ii. No one can serve on both X and Y.
 - iii. F cannot serve on a committee with G or with J.
 - iv. H cannot serve on a committee with I.
14. If H serves on X, which of the following must be true?
- (A) F serves on X (C) I serves on Y
(B) G serves on Y (D) K serves on X

15. If L does not serve with K or I, which of the following cannot be true
 (A) F serves with I (C) H serves with K
 (B) G serves with H (D) I serves with K
16. There would be only one possible distribution of people on the committees if which one of the following conditions were added to the original set of conditions?
 (A) F and L must serve on X, and H must serve on Y
 (B) J must serve on X, and K and L must serve on Y
 (C) G and L must serve on X
 (D) H and four other people must serve on X

Directions for (Questions 17 – 20). For a panel of professors to assess the budget speech, the producer must choose two Republicans and two Democrats. At least one professor must be an economist and at least one a military expert. Available Republicans are A, B, C, D and E; available Democrats are F, G, H and I. C, F and G are economists, D and I are military experts. F will not sit in the same room with C, and will take part only if A is on the panel. D refuses to take part with G, and E refuses to take part with I.

17. Which of the following is not an acceptable panel?
 (A) F, H, A, D (C) G, H, A, C
 (B) F, I, A, D (D) G, I, A, C
18. If A and B are chosen as the Republicans, who can be chosen as the Democrats?
 (A) F and I only (C) F and G or G and H only
 (B) F and I or G and I only (D) F and I, G and I, or H and I
19. If G is chosen, which of the following must be true?
 i. Any acceptable panel must contain I.
 ii. Any acceptable panel must contain A.
 iii. There is no acceptable panel which contains B.
 (A) I only (C) I and II only
 (B) II only (D) I, II and III
20. How many acceptable panels can the producer put together?
 (A) 6 (C) 8
 (B) 7 (D) 9

Directions for (Questions 21 – 23). Four sisters - S, T, U and V are playing a game such that the loser doubles the money of each of the other players from her share. They played four games and each sister lost one game, in alphabetical order. At the end of the fourth game, each sister had Rs. 32.

21. How many rupees did S start with ?
 (A) Rs. 66 (C) Rs. 10
 (B) Rs. 70 (D) Rs. 60
22. Who started with the highest amount?
 (A) S (C) U
 (B) T (D) V
23. What was the amount with U at the end of the second round?
 (A) Rs. 36 (C) Rs. 84
 (B) Rs. 72 (D) Rs. 54

Directions for (Questions 24 – 26). Four persons - A, B, C and D – are camping at four separate campsites – E, F, G and H, not necessarily in that order. The campsites are located on four separate lakes – I, J, K and L, not necessarily in that order – which are in four separate states – M, N, O and P, not necessarily in that order.

- i. B is camping on K lake.
 ii. H campsite is on J lake, which is in N.
 iii. The person at I lake, a native of P, camps only in that state.
 iv. D is at F campsite.
 v. A is camping in O.
24. Where must B be camping?
 (A) In M (C) At F campsite
 (B) On L lake (D) In N
25. I lake is the site of
 (A) F campsite (C) The camp in O
 (B) A's camp (D) C's Camp

26. On the basis of the information given, it is possible to deduce that
- A is not at H campsite
 - C is in P
 - D is not at E campsite
- (A) I only
(B) II only
(C) III only
(D) I and III only
27. How many 7's are there which has a 7 preceded by it and 7 following it in the following sequence?
7787778777776777977877778
- (A) 8
(B) 2
(C) 6
(D) 4

Directions (Q. 28 – 31) : Read the following information carefully to answer these questions.

A sample poll of 200 votes revealed the following information concerning three candidates A, B and C who are running for three different offices.

28 in favour of both A and B

98 in favour of A or B, but not C

42 in favour of B but not A or C

122 in favour of B or C but not A

64 in favour of C but not A or B

14 in favour of A and C but not B

28. How many voters were in favour of all the three candidates?
- (A) 14
(B) 8
(C) 20
(D) 16
29. How many voters were in favour of C alone?
- (A) 36
(B) 42
(C) 64
(D) 38
30. How many voters were in favour of A irrespective of B or C?
- (A) 78
(B) 64
(C) 42
(D) 56
31. How many voters were in favour of only one of the candidates?
- (A) 58
(B) 78
(C) 106
(D) 142
32. Insert the missing number:
- | | | |
|---|----|----|
| 7 | 16 | 9 |
| 5 | 21 | 16 |
| 9 | ? | 4 |
- (A) 26
(B) 13
(C) 18
(D) 7
33. Insert the missing number:
- | | | | | |
|----|----|----|----|---|
| 16 | 15 | 17 | 14 | ? |
|----|----|----|----|---|
- (A) 20
(B) 18
(C) 34
(D) 28
34. In June a baseball team that played 60 games had won 30% of its games played. After a phenomenal winning streak this team raised its average to 50%. How many games must the team have won in a row to attain this average?
- (A) 12
(B) 20
(C) 24
(D) 30
35. A clock is so placed that at 12 noon its minute hand points towards north-east. In which direction will its minute hand point at 1:45 pm?
- (A) North
(B) South
(C) West
(D) East

Directions for (Question No. 36 to 38): Three local – F, G and H – and three out-of-state companies – X, Y and Z – must each be scheduled for a different one of six consecutive days from Monday through Saturday to make their presentations.

- i. F's presentation must be made earlier than H's presentation
- ii. X's presentation must be earlier than Z's presentation, but not on the day immediately preceding Z's presentation.
- iii. The three presentations by the local companies cannot all be made before any presentation by an out-of-state company is made, nor can the three presentations by the out-of-state companies all be made before any presentation by a local company is made.

36. Which of the following is a list of the six companies in an order in which they could be scheduled to make their presentations?

- | | |
|----------------------|----------------------|
| (A) F, H, G, X, Y, Z | (C) G, Y, F, X, Z, H |
| (B) F, H, Z, G, Y, X | (D) X, G, Y, F, H, Z |

37. If F is to make its presentation after Z makes its presentation, which of the following is a day on which X could make its presentation?

- | | |
|---------------|--------------|
| (A) Tuesday | (C) Thursday |
| (B) Wednesday | (D) Friday |

38. If H is to make its presentation on Wednesday and if Y's presentation is to be made earlier than H's presentation, then G must make its presentation on

- | | |
|-------------|--------------|
| (A) Monday | (C) Thursday |
| (B) Tuesday | (D) Friday |

Directions for (Question No. 39 to 40) : Unscramble the letters in the following words and find the odd one out.

- | | |
|--------------|------------|
| 39. (A) UNG | (C) OPSTIL |
| (B) EIRFL | (D) WROSD |
| 40 (A) EHDLI | (C) AKLDNA |
| (B) MBIUMA | (D) OIHCCN |

C. Problem solving : Mathematics

41. If $y = \sin kx + \cos kx$, then $\frac{d^n y}{dx^n}$ equals

- | | |
|--------------------------------|---------------------------------------|
| (A) $k^n [1 + \sin 2kx]^{1/2}$ | (C) $k^n [1 + (-1)^n \sin 2kx]^{1/2}$ |
| (B) $k^n [1 - \sin 2kx]^{1/2}$ | (D) $k^n [1 - (-1)^n \sin 2kx]^{1/2}$ |

42. If $\cos(\theta + i\phi) = R(\cos \alpha + i \sin \alpha)$, $i = \sqrt{-1}$, then ϕ equals

- | | |
|---|---|
| (A) $\log \left[\frac{\sin(\theta - \alpha)}{\sin(\theta + \alpha)} \right]$ | (C) $\frac{1}{2} \log \left[\frac{\sin(\theta - \alpha)}{\sin(\theta + \alpha)} \right]$ |
| (B) $\log \left[\frac{\sin(\theta + \alpha)}{\sin(\theta - \alpha)} \right]$ | (D) $\frac{1}{2} \log \left[\frac{\sin(\theta + \alpha)}{\sin(\theta - \alpha)} \right]$ |

43. The integral $\int_0^{\frac{\pi}{2}} \phi(\cos 2x) \cos x \, dx$ equals

- | | |
|---|---|
| (A) $\frac{1}{\sqrt{2}} \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \phi(\cos 2x) \cos x \, dx$ | (C) $\sqrt{2} \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \phi(\cos 2x) \sin x \, dx$ |
| (B) $\sqrt{2} \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \phi(\cos 2x) \sin x \, dx$ | (D) $\sqrt{2} \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \phi(\cos 2x) \cos x \, dx$ |

44. For any function $f(x)$ & $g(x)$, integrable over the interval (a, b) the value of $\left| \int_a^b f(x)g(x)dx \right|$

(A) $< \sqrt{\int_a^b f^2(x)dx \int_a^b g^2(x)dx}$

(C) $\leq \sqrt{\int_a^b f^2(x)dx + \int_a^b g^2(x)dx}$

(B) $\leq \sqrt{\int_a^b f^2(x)dx + \int_a^b g^2(x)dx}$

(D) $\leq \sqrt{\int_a^b f^2(x)dx \int_a^b g^2(x)dx}$

45. In a class P girls and Q boys ($P > Q$) are to be seated in a row so that no two boys are together. The number of ways in which they can be seated is

(A) $\frac{P!(Q+1)!}{(P-Q+1)!}$

(C) $\frac{(P!)^2}{(P-Q+1)!}$

(B) $\frac{(P+1)!Q!}{(P-Q+1)!}$

(D) $\frac{P!(P+1)!}{(P-Q+1)!}$

46. If one root of the quadratic equation $ax^2 + bx + c = 0$ is equal to the n -th power of the other, then

(A) $(ac^n)^{\frac{1}{n+1}} - (a^n c)^{\frac{1}{n+1}} + b = 0$

(C) $(ac^n)^{\frac{1}{n+1}} - (a^n c)^{\frac{1}{n+1}} - b = 0$

(B) $(ac^n)^{\frac{1}{n+1}} + (a^n c)^{\frac{1}{n+1}} + b = 0$

(D) None of the above

47. The integral $\int \frac{dx}{x\sqrt{1-x^3}}$ is given by

(A) $\frac{1}{3} \log \left[\frac{\sqrt{1-x^3} + 1}{\sqrt{1-x^3} - 1} \right]$

(C) $\frac{2}{3} \log \left[\frac{1}{\sqrt{1-x^3}} \right]$

(B) $\frac{1}{3} \log \left[\frac{\sqrt{1-x^3} - 1}{\sqrt{1+x^3} + 1} \right]$

(D) $\frac{1}{3} \log(\sqrt{1-x^3})$

48. How many ways are there to distribute six(6) different toys to three(3) different children such that each child gets at least one(1) toy?

(A) 450

(C) 480

(B) 550

(D) 540

49. How many ways can the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 be arranged so that no even digit is in its original position?

(A) 3170980

(C) 2170680

(B) 2180580

(D) 3270680

50. What is the maximum value of the function $Y(x_1, x_2) = x_1 + 2x_2$ where

$$2x_1 + 3x_2 \leq 6$$

$$x_1 + 4x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

(A) 16/5

(C) 17/5

(B) 14/5

(D) 12/5