Indian Institute of Technology Bombay

Examination for recruitment of software engineers

Candidates must carefully read instructions before starting the examination

Please return this question paper along with your response at the end of the examination

Instructions for candidates

1	Written test shall start on xxx at xxx Hrs. Test duration is 2 hours and 30 minutes. All questions are compulsory.
2	Candidates are **NOT** allowed to carry calculators, mobiles, jackets and bags.
3	Candidates shall not be allowed to leave examination hall except for medical reasons for one hour after the start of examination
4	This written test comprises of xx questions All questions are multiple choice (MCQ) where only one of the offered options is correct. **Note: Negative marks shall NOT be awarded for incorrect responses**
5	The question booklet has a response sheet. Candidates should use this response sheet to provide their responses. Candidates MUST provide following information on the response sheet at place provided for the purpose. 1. Candidate ID (As printed on their online application form) 2. Name 3. Date of Birth 4. Birth category 5. Signature Failing to fill above data may result in loss of candidature of the applicant
6	Candidates should remain seated at the end of examination. IIT Bombay staff shall collect question paper as well as the response sheet.
8	Evaluated response sheets must be inscribed with candidate name and ID, and handed over to IIT Bombay staff members
9	*Candidates to note that eligibility for this post as described in advertisement No. xxx dated xxxis a **necessary prerequisite** for their candidature to be considered for this job-position*

Recruitment Administration Section, IIT Bombay

Questions from 1 to 20 carry 2 marks each

1. Present ages of Nirmal and Shyam are in the ratio of 5:4 respectively. Three years hence, the ratio of their ages will become 11:9 respectively. What is Shyam's present age in years?

   A. 28 B. 27 C. 26 D. 24

2. The sum of ages of 5 children born at the intervals of 3 years each is 50years. Find out the age of the youngest child?

   A. 6years B. 5years C. 4years D. 3years

3. My brother is 3 years elder to me. My father was 28 years of age when my sister was born while my mother was 26 years of age when I was born. If my sister was 4years of age when my brother as born, then what was the age of my father when my brother was born?

   A. 35years B. 34years C. 33years D. 32years

4. The age of father 10years ago was thrice the age of his son. Ten years hence, father's age will be twice that of his son. What is the ratio of their present ages?

   A. 7:3 B. 3:7 C. 9:4 D. 4:9

5. The ages of two persons differ by 16 years. 6 years ago, the elder one was 3times as old as the younger one. What are their present ages of the elder person?

   A. 10 B. 20 C. 30 D. 40

6. Sandeep's age after six years will be three-seventh of his father's age. Ten years ago the ratio of their ages was 1:5. What is Sandeep's father's age at present?

   A. 30years B. 40years C. 50years D. 60years

7. Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?

   A. Rs6400 B. Rs6500 C. Rs7200 D. Rs7500

8. The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:

   A. 2.0 B. 2.5 C. 3.0 D. 4.0

9. The difference between simple interest and compound on Rs. 1200 for one year at 10% per annum reckoned half-yearly is

   A. Rs2.50 B. Rs3.0 C. Rs3.75 D. Rs4.0

10. A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had:

    A. 588 apples B. 600 apples C. 672 apples D. 700 apples

11. What percentage of numbers from 1 to 70 have 1 or 9 in the unit's digit?

    A. 1 B. 14 C. 20 D. 21

12. How many seconds will a 500 metre long train take to cross a man walking with a speed of 3 km/hr in the direction of the moving train if the speed of the train is 63 km/hr?

A. 25 B. 30 C. 40 D. 45

13. A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 km/hr and 4 km/hr and passes them completely in 9 and 10 seconds respectively. The length of the train is:

A. 45m B. 50m C. 54m D. 72m

14. A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the hall is:

A. 720 B. 900 C. 1200 D. 1800

15. A boat having a length 3 m and breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets on it. The mass of the man is:

A. 12kg B. 60kg C. 72kg D. 96kg

16. A right triangle with sides 3 cm, 4 cm and 5 cm is rotated the side of 3 cm to form a cone. The volume of the c one so formed is:

A. $12\pi cm^3$ B. $15\pi cm^3$ C. $16\pi cm^3$ D. $20\pi cm^3$

17. The smallest 6 digit number exactly divisible by 111 is:

A. 111111 B. 110011 C. 100011 D. 110101

18 If x and y are positive integers such that (3x + 7y) is a multiple of 11, then which of the following will be divisible by 11 ?

A. 4x + 6y B. x + y + 4 C. 9x + 4y D. 4x - 9y

19. In a division sum, the remainder is 0. As student mistook the divisor by 12 instead of 21 and obtained 35 as quotient. What is the correct quotient ?

A. 0 B. 20 C. 13 D. 12

20. (51 + 52 + 53 + ... + 100) = ?

A. 2525 B. 2975 C. 3775 D. 3225

Questions from 21 to 40 are 1.5 marks each

21. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.

A. 4 B. 7 C. 9 D. 13

22. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together ?

A. 4 B. 10 C. 16 D. 15

23. A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 seconds, B in 308 seconds and c in 198 seconds, all starting at the same point. After what time will they again at the starting point ?

A. 26 minutes and 18 sec B. 42 minutes and 36 sec C. 45 minutes D. 46 minutes and 12 seconds

24. If $3^{(x-y)} = 27$ and $3^{(x+y)} = 243$, then x is equal to:

A. 0 B. 2 C. 4 D. 6

25. A man is 24 years older than his son. In two years, his age will be twice the age of his son. The present age of his son is:

A. 14 years B. 18 years C. 20 years D. 22 years

26. If m and n are whole numbers such that $m^n = 121$, the value of $(m - 1)^{n+1}$ is:

A. 1000 B. 10 C. 121 D. 1

27. What least number must be added to 1056, so that the sum is completely divisible by 23 ?

A. 3 B. 2 C. 18 D. 21

28. 3 pumps, working 8 hours a day, can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the tank in 1 day?

A. 9 B. 10 C. 12 D. 11

29. If cost of x metres of wire is d rupees, then what is the cost of y metres of wire at the same rate?

A. Rs. $\left(\frac{xy}{d}\right)$ B. Rs.(xd) C. Rs.(yd) D. Rs. $\left(\frac{yd}{x}\right)$

30. A boat can travel with a speed of 13 km/hr in still water. If the speed of the stream is 4 km/hr, find the time taken by the boat to go 68 km downstream.

A. 2 hours B. 3 hours C. 4 hours D. 5 hours

31. Which of the following statements is not correct?

A. $\log_{10} 10 = 1$ B. log (2 + 3) = log (2 x 3)C. $\log_{10} 1 = 0$D. log (1 + 2 + 3) = log 1 + log 2 + log 3

32. Find the odd man out in 3, 5, 11, 14, 17, 21

A. 21 B. 17 C. 14 D. 3

33. Find the odd man out in 3, 5, 7, 12, 17, 19

A. 19 B. 17 C. 5 D. 12

34. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?

A. 10 B. 9 C. 12 D. 20

35. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is:

A. 1 hour B. 2 hours C. 3 hours D. 4 hours

36. In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer.Abhay's speed is:

A. 6kmph B. 5kmph C. 6.25kmph D. 7.5kmph

37. Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 km/hr, he will reach there at 12 noon if he travels at 15 km/hr. At what speed must he travel to reach A at 1 P.M.?

A. 8 km/hr B. 11 km/hr C. 12 km/hr D. 14 km/hr

38. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

A. 12days B. 15days C. 16days D. 18days

39. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age?

A. 2 times B. 2.5 times C. 2.75 times D. 3 times

Problems from 41 to 70 are 1 marks each

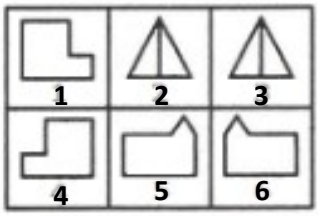
40. Group the given figures into three classes using each figure only once

A. 1,4 ; 2,3 ; 5,6

B. 1,5 ; 2,6 ; 4,3

C. 1,6 ; 2,3 ; 4,5

D. 1,2 ; 3,6 ; 4,5



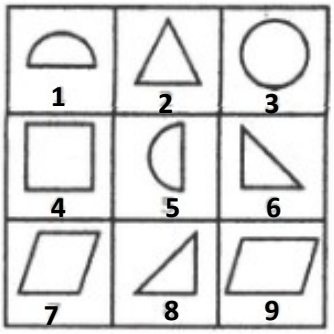
41. Group the given figures into three classes using each figure only once

A. 1,3,5 ; 2,6,9 ; 4,7,8

B. 2,3,4 ; 5,6,8 ; 9,1,7

C. 1,3,5 ; 2,6,8 ; 4,7,9

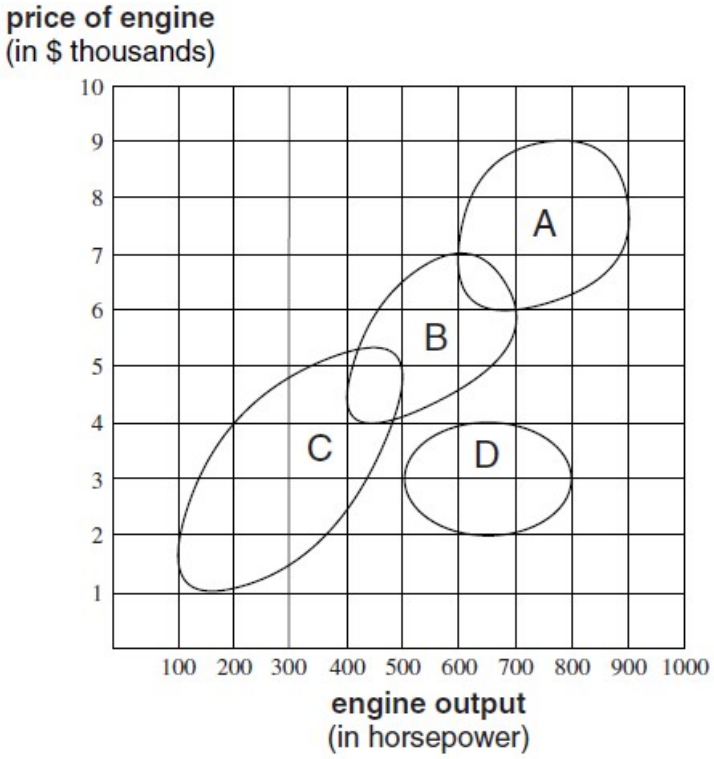
D. 3,2,4 ; 6,5,8 ; 7,9,1



Study graph shown below for answering questions 43 - 46

The accompanying graph presents information on 4 different technologies used for producing a certain type of engine. Each technology is marked by a letter (A-D)and is represented on the graph by a closed area. Each point in that area represents the horsepower and price of an engine that can be manufactured using that technology. For example, using technology A, it is possible to manufacture a 750-horsepower engine at a price of $8,500, but it is not possible to manufacture an engine with the same horsepower at a price of $5,000.

Note: Technologies A and B have an area that overlaps, as do technologies BandC.



Note: In answering each question, disregard the information appearing in other questions.

42. What is the range of engine outputs (in horsepower) that can be obtained using technology A as well as technology B ?

A) 400–500 B) 500–600 C) 600–700 D) None of the above

43. What is the minimum price at which an engine with an output of 650 horsepower can be manufactured?

A) $1,000 B) $2,000 C) $1,500 D) $2,500

44. One of the companies that manufactures engines decided it will no longer use technology C. After it implements the decision, what will be the minimum output (in horsepower) of an engine priced at $3,000 that the company produces?

A) 500 B) 400 C) 300 D) It is impossible to produce an engine of this kind.

45. A certain company is not allowed to produce engines with an output of over 550 horsepower. Which technologies can the company use to manufacture its engines?

A) C only B) B and C only C) C and D only D) B, C and D only

Study the table below and answer questions 47 - 50

The table below contains data on 10 companies from different industries. The companies are designated by the letters A through J.
For each company, the table shows the industry to which it belongs, its sales volume, the current year's profits, its asset value, and the number of workers it employs.
For example, Company E deals in electronics, employs 400,000 workers, and has assets valued at $90 million. The company's sales volume totalled $70 billion this year (9% higher than last year's sales volume), and its profits amounted to $6,000 million (60% higher than last year's profits).

An example of how to calculate percentage of change: If a certain company's sales volume totalled $40 billion last year, and this year the volume increased to $50 billion, then the percentage of change compared to last year is 25%. $\left(\frac{50-40}{40} x\ 100\right)$.

		Sales		Profits			
Name of company	**Industry**	**Sales** (in $ billions)	**Percentage of change compared to last year**	**Profits** (in $ millions)	**Percentage of change compared to last year**	**Asset value** (in $ millions)	**Number of workers** (in thousands)
A	Automobile	125	-1.5	-2,000	-150	180	750
B	Oil	110	25	6,500	0	100	150
C	Oil	105	22	5,000	40	390	100
D	Automobile	100	1.5	900	-80	180	350
E	Electronics	70	9	6,000	60	90	400
F	Automobile	65	7	3,000	15	55	100
G	Metals	60	25	1,000	-20	not given	400
H	Oil	60	20	3,000	-15	60	120
I	Oil	55	15	2,000	7	40	70
J	Electronics	50	6	4,500	10	150	300

Note: In answering each question, disregard the information appearing in the other questions.

46. Which of the companies in the automobile industry has the lowest asset value?
A) A B) D C) F D) A and D

47. Assuming that profits are divided equally among all the workers in a company, which of the following companies shows the greatest profit per individual worker?
A) C B) B C) H D) F

48. What was Company G 's sales volume last year (in $ billions)?

A)75 B) 48 C) 64 D) 76

49. A company's expenditure in a particular year is defined as follows:
(sales in that year) – (profits in that year) = (expenditure for that year)
The company with the greatest expenditure this year belongs to which industry?

A) Automobile B) Oil C) Electronics D) Metals

Read following paragraph and answer questions 51-52

It is to progress in the human sciences that we must look to undo the evils which have resulted from knowledge of physical world hastily and superficially acquired by population unconscious of the changes in themselves that the new knowledge has imperative. The road to a happier world than any known in the past lies open before us if atavistic destructive passions can be kept in leash while the necessary adaptations are made. Fears are inevitable in time, but hopes are equally rational and far more likely to bear good fruit. We must learn to think rather less of the dangers to be avoided than of the good that will lie within our grasp if we can believe in it and letit dominate our thoughts. Science, whatever unpleasant consequences it may have by the way, is in its very nature a liberator,

a liberator of bondage to physical nature and in time to come, a liberator from the weight of destructive passions. We are on the threshold of utter disaster or unprecedentedly glorious achievement. No previous age has been fraught with problems so momentous; and it is to science that we must look to for a happy future.

50.What does science liberate us from?

A. fears and destructive passions
B. slavery to physical nature and from passions
C. bondage to physical nature
D. idealistic hopes of glorious future

51.Should human sciences be developed because they will

A. provide more knowledge of the physical word
B. make us conscious of the changing world
C. make us conscious of the changing in ourselves
D. eliminate the destruction caused by a superficial knowledge of the physical world

Read following paragraph and answer questions 53-55

I felt the wall of the tunnel shiver. The master alarm squealed through my earphones. Almost simultaneously, Jack yelled down to me that there was a warning light on. Fleeting but spectacular sights snapped into and out of view, the snow, the shower of debris, the moon, looming close and big, the dazzling sunshine for once unfiltered by layers of air. The last twelve hours before re-entry were particular bone-chilling. During this period, I had to go up in to command module. Even after the fiery re-entry splashing down in 81^{o} water in south pacific, we could still see our frosty breath inside the command module.

52. The word 'Command Module' used twice in the given passage indicates perhaps that it deals with

A. an alarming journey
B. a commanding situation
C. a journey into outer space
D. a frightful battle.

53. Which one of the following reasons would one consider as more as possible for the warning lights to be on?

A. There was a shower of debris.
B. Jack was yelling.
C. A catastrophe was imminent.
D. The moon was looming close and big.

54. The statement that the dazzling sunshine was "for once unfiltered by layers of air" means

A. that the sun was very hot
B. that there was no strong wind
C. that the air was unpolluted
D. none of above

Answer questions 56-59 in context of Java language

55. Which will legally declare, construct, and initialize an array?

A. int [] myList = {"1", "2", "3"};
B. int [] myList = (5, 8, 2);
C. intmyList [] [] = {4,9,7,0};
D. intmyList [] = {4, 3, 7};

56. Which three are legal array declarations?

1. int [] myScores [];
2. char [] myChars;
3. int [6] myScores;
4. Dog myDogs [];
5. Dog myDogs [7];

A. 1, 2, 4 B. 2, 4, 5 C. 2, 3, 4 D. All are correct.

57. Which one of the following will declare an array and initialize it with five numbers?

A. Array a = new Array(5);B. int [] a = {23,22,21,20,19};C. int a [] = new int[5];D. int [5] array;

58. Which one is a valid declaration of a boolean?

A. boolean b1 = 0; B. boolean b2 = 'false'; C. boolean b3 = false; D. boolean b5 = no;

59.An Enterprise Resource Planning application is an example of a _____ .

A. Single-user database application
B. Multiuser database application
C. E-commerce database application
D. Data mining database application

60. You have run an SQL statement that asked the DBMS to display data in a table named USER_TABLES. The results include columns of data labeled "TableName," "NumberOfColumns" and "PrimaryKey." You are looking at _____ .

A. metadata B. userdata C. A report D. indexes

61. The SQL command to create a table is:

A. MAKE TABLE. B. ALTER TABLE. C. DEFINE TABLE. D. CREATE TABLE.

62. The DROP TABLE statement:

A. Deletes the table structure only.
B. Deletes the table structure along with the table data.
C. Works whether or not referential integrity constraints would be violated.
D. Is not ansql statement.

63. Which of the following services use TCP?1. DHCP, 2. SMTP, 3. HTTP, 4. TFTP, 5. FTP

A. 1 and 2 B.1, 2 and 4 C. 2, 3 and 5 D. 1, 3 and 4

64. You want to implement a mechanism that automates the IP configuration, including IP address, subnet mask, default gateway, and DNS information. Which protocol will you use to accomplish this?

A. DHCP B. SNMP C. SMTP D. ARP

65. Which of the following is private IP address?

A. 12.0.0.1 B. 168.172.19.39 C. 172.15.14.36 D. 192.168.24.43

66. Identify the figure that completes the pattern.

A. 4 B. 2 C. 3 D. 1

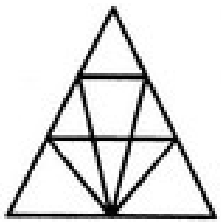
67. Find the number of triangles in the given figure.

A. 12

B. 18

C. 22

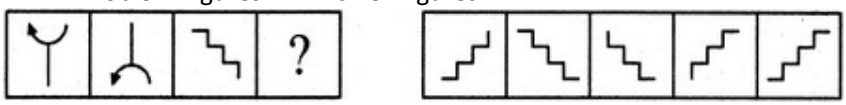
D. 26



68. This question consists of two sets of figures. Figures A, B, C and D constitute the Problem Set while figures 1, 2, 3, 4 and 5 constitute the Answer Set. There is a definite relationship between figures A and B. Establish a similar relationship between figures C and D by selecting a suitable figure from the Answer Set that would replace the question mark (?) in fig. (D).

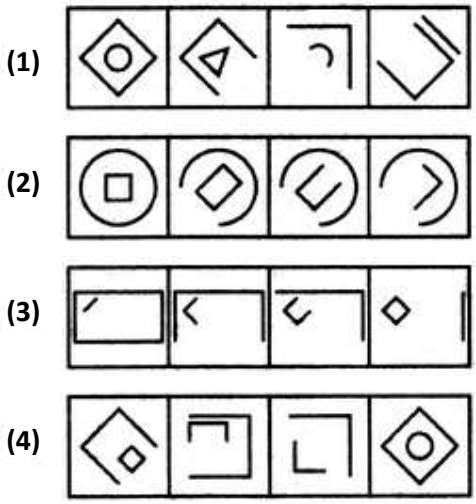
Select a suitable figure from the Answer Figures that would replace the question mark (?).

Problem Figures Answer Figures



A. 3 B. 4 C. 1 D. 2

69. Choose the set of figures which follow the rule: "Closed figures gradually become open and open figures gradually become closed".



A. 1 B. 2 C. 3 D. 4

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