

Entrance Test -2007

M.A. / M.Sc. Computational Finance

Institute of Mathematics and Applications

Bhubaneswar

Full Marks :100

Time-2 hours

Answer all the questions

All questions carry equal marks

1. Suppose that a die is biased , so that 3 appears twice as often as each other number but that the other five outcomes are equally likely. What is the probability that an odd number appears when we roll this die.
2. What is the conditional probability that a family of two children has two boys given that they have at least one boy. Assume that each of the possibility BB, BG, GB and GG are equally likely, where B represents a boy and G represents a girl.
3. If X and Y are two independent random variable then calculate (i) Variance of $(X + Y)$
(ii) Regression coefficient of Y on X and regression coefficient of X on Y .

4. The random variable X defined on a countable probability measure space as $\text{prob} \left\{ \omega : X(\omega) = n \quad \frac{1}{n+1} \right\}$. Calculate EX .
5. Determine the value of C such that $f(u) = u^3 e^{-u}, u \geq 0$ is a probability density function of a random variable X , and hence Calculate variance of X .
6. In the set of positive distinct integers $\{a, b, c, d, e\}$ the median is 16. What is the least possible value of $a + b + c + d + e$?
7. If $m + n = 24$ and $m - n + p = 15$ then what is the value of $4m + 2p$?
8. In the equation $ax + b = 26, x$ is a constant . If $a = 3$ when $b = 5$, what is the value of b when $a = 5$?
9. A says to B , "*I am twice as old as you were when I was as old as you are*" .
If the sum of their present age in 77 years then what is the present age of A ?
10. Naresh's school bus picks him up from his home and then makes two right turns and are left turn to reach his school. While reading the school , the bus faces North-East. What direction was the bus facing while picking up Naresh

Direction for question 6 and 7 :

Each of the questions below consists of a question and two or three statements given below it . decide whether the data provided in the statements are sufficient to answer the given question. Choose your answer from among the alternatives :

11. How much did Suresh get as profit in the business done with Ramesh and Haresh ?

Statements

I. Ramesh invested twice as much money as that of investment of Suresh and Harish put together.

II. The profits of Suresh and Harish were in the ratio of 2 :3 respectively .

III. Harish got a profit of Rs . 200 more than that of Suresh .

- (a) Only I and III together are sufficient
- (b) Only II and III together are sufficient
- (c) Either II above or III above is sufficient
- (d) All of I, II and III are necessary
- (e) None of these .

12. What is the speed of the boat in still water ? Statements

I. The speed of the current is 7 kms .

ii. A boat rows up and then down a distance of 45 Kms in 14 hours .

III. The boat covers a distance of 40 km , from A to B in 8 hours .

- (a) All of I , II and III are necessary
- (b) Either I above or II above is sufficient
- (c) Both I and II are sufficient
- (d) Both I and II are sufficient
- (e) None of these .

13. The statements are given below followed four conclusions. Considering the given statements to be true write down which of the given conclusions logically statements :

Some bananas are apples

All apples are tamatoes

Conclusions :

I. Some bananas are tamatoes

II. Some potatoes are bananas

III. Some apples are potatoes

IV. Some apples are bananas .

14. Out of a total 120 musicians in a club , 5 percent can play all three instruments guitar , violin and flute. It so happens that the number if musicians who can play any two and only two of the above instruments is 30 . the number of musicians who can play the guitar alone is 40 . What is the total number of those who can play violin alone or flute alone ?

15. If an item is sold for x rupees , there is a loss of 15 percent. If however , the same item is sold for y rupees , there is a profit of 15 percent . Find the ratio $y; x$?

16. If x and y are real numbers and $\frac{4^x}{2^{x+y}} = 8$ and $\frac{9^{x+y}}{3^{5y}} = 243$ then find the value of xy .

17. Two pipes A and B can separately fill up a water in $7\frac{1}{2}$ and 5 minutes and third pipe c can carry off 14 liters of water per minute . If all the pipes are opened simultaneously when the tank is full of water , it is emptied in one hour. How many liters of water does the tank hold ?
18. What is the value of $\cot 5^\circ . \cot 10^\circ . \cot 15^\circ \dots \cot 85^\circ$?
19. In a class, there are 18 boys who are over 160 cm tall. If these constitutes three fourths of the boys and total number of boys is two-third of the total number of students in the class, what is the number of girls in the class ?
20. If $x > 0$ what is the minimum value of $x + \frac{1}{x}$?
21. The Japanese economic model created strong domestic industries through subsidies from its Ministry of trade and by closing off competitive foreign firms to its domestic market. This strategy promised to help economic growth by incubating domestic industries. New Japanese industries could count on a known local demand and would be protected from competition by tariffs and other barriers. The programme could reduce the amount of imports and therefore improve the nation's balance of trade.
- Which of the following , based on the passage above, is a weakness in this economic strategy ?
- A. A protectionist policy will create animosity among other nations .
- B. Fast growth of small industries will create a class of millionaires and increase

the inequality of income .

C. Subsidies and import constraints keep domestic prices high and impose a burden on consumers .

D. Quotas are more regressive than tariffs.

E. The demand for the products made by the incubated industries would not be known.

22. During the past year , BOZ Corporation , a cigarette manufacturer, has engaged in a "Corporate image" advertising campaign. One executive now urges that the advertising be extended for another year because profits have increased by 29 percent over the previous year . Another executive , however, is skeptical. She observes that the increases are typical for the industry over the past year, although none of their competitors have used corporate image advertising. The most accurate way of summarizing the second executive's point would be :

A. She argues that the effect may not really be due to its supposed cause because there has not been a sufficient lapse of time between the cause and the effect.

B. She argues that the assignment of a cause for this effect is premature , because there is as yet no well-established theory of such interactions.

C. She argues that corporate image advertising is unprofitable , since it has evidently benefited competitors as much as the corporation that paid for it.

D. She knows that effective advertising requires a constant influx of new ideas and approaches , and she argues that one year of corporate image advertising

is enough for a while .

E. She argues that the effect may not be due to its alleged cause since the same effect is found elsewhere without that cause . 23. There has been a sharp increase in the subscription prices of many professional and scholarly journals in the past seven years. Many publishers ascribe the necessity for this increase to the easy availability of photocopying facilities, when enable people simply to copy the articles they want rather than buying he journal.

Which of the following, if it is true, would make this explanation more plausible? A. The great majority of professional and scholarly journals have a massive backlog of papers awaiting publigreion. B. Over the past five years three has been a substantial decline in the number of individual subscriptions to professional and scholarly journals, while library subscriptions have remained fairly stable. C. In the five years immediately preceding the price surge, there was a substantial decline in the number of individual subscriptions to professional and scholarly journals, while library subscription remained fairly stable. D. Many libraries have recently begun cutting back on subscription s to professional and scholarly journals. E .In almost every field, several new professional and scholarly journals have begun publigrein in the past few years.

24. The symptoms of mental disorders are behavioral, cognitive, or emotional problems. Some patients with mental disorders can be effectively treated with psychotherapy, but it is now know that in some patients' mental disorders re-

sult from chemical imbalances affecting the brain. Thus, these patients can be effectively treated only with medication that will reduce or correct the imbalance. The argument depends on assuming which one of the following? A. Treatment by psychotherapy can produce no effective reduction in or correction of chemical imbalances that cause mental disorders. B. Treatment with medication always shows faster result for patients with mental disorders than does treatment with psychotherapy C. Most mental disorders are not the result of chemical imbalances affecting the brain.

D. Medication is always more effective in treating patients with mental disorders than is psychotherapy.

E. Treatment with psychotherapy has no effect on mental disorders other than a reduction of symptoms.

23. There has been a sharp increase in the subscription prices of many professional and scholarly journals in the past seven years. Many publishers ascribe the necessity for this increase to the easy availability of photocopying facilities, which enable people simply to copy the articles they want rather than buying the journal.

Which of the following, if it is true, would make this explanation more plausible?

A. The great majority of professional and scholarly journals have a massive backlog of papers awaiting publication.

B. Over the past five years there has been a substantial decline in the number of individual subscriptions to professional and scholarly journals, while library subscriptions have remained fairly stable.

C. In the five years immediately preceding the price surge, there was a substantial decline in the number of individual subscriptions to professional and scholarly journals, while library subscription remained fairly stable.

D. Many libraries have recently begun cutting back on subscriptions to professional and scholarly journals.

E. In almost every field, several new professional and scholarly journals have begun publication in the past few years.

24. The symptoms of mental disorders are behavioral, cognitive, or emotional problems. Some patients with mental disorders can be effectively treated with psychotherapy, but it is now known that in some patients' mental disorders result from chemical imbalances affecting the brain. Thus, these patients can be effectively treated only with medication that will reduce or correct the imbalance.

The argument depends on assuming which one of the following?

A. Treatment by psychotherapy can produce no effective reduction or correction of chemical imbalances that cause mental disorders.

B. Treatment with medication always shows faster results for patients with mental disorders than does treatment with psychotherapy.

C. Most mental disorders are not the result of chemical imbalances affecting the

brain.

D. . Medigreion is always more effective in treating patients with mental disorders than is psychotherapy. E. E.Treatnment with psychotherapy has no effect on mental disorders other than a reduction of symptoms.

25. Beautiful beaches attract people , no doubt about it . Just look at city's beautiful beaches , which are among the most crowded beaches in the state. Each of the following exhibits a pattern of reasoning most similar to the one exhibited in the argument above ?

A. Moose and bear usually at the same drinking hole at the same time of day . therefore , moose and bear must grow thirsty at about the same time.

B. Children who are scolded severely tend to misbehave more often than other children. Hence if a child is not scolded severely that child is less likely to misbehave.

C. This software programme helps increase the work efficiency of its users. As a result, these users have more free time for other activities.

D. During warm weather my dog suffers from fleas more so than during coller weather . Therefore , fleas must thrive in a warm environment .

E. Pesticides are known to cause anemia in some people. However, most anemic people live in regions where pesticides are not commonly used.