

단국대학교 2018학년도 편입생 모집 필기고사

자연계열 문제지

(㉠형)



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※ 밑줄 친 부분과 뜻이 가장 가까운 것을 고르시오. (1-8) [각3점]

1. I went at reading only “hard” books like Ueberweg’s *History of Philosophy* with the humorless obstinacy of a sixteen-year-old.
① stubbornness ② determinacy ③ coldness ④ responsibility
2. Communication is the proving ground where a scholar tests his findings. Without communication his pursuit of truth withers into eccentricity.
① withdraws ② degenerates ③ endangers ④ develops
3. He is often expected to get quick results with slow acting economic forces; and he must work with people, not with inanimate objects.
① lifeless ② enigmatic ③ insufficient ④ adequate
4. The fire department workers wracked their brains trying to find a way to rescue the kitten from the clogged sewer line.
① beat ② inlaid ③ shrank ④ wept
5. Raymond felt sluggish during the first half of the championship match, but then he got his second wind and scored the winning goal.
① superior ② energetic ③ upset ④ lethargic
6. He wrote with crackling acuity about losing love and losing one’s mind and, above all, about the curse of living in the past.
① obscurity ② soreness ③ cruelty ④ abstruseness
7. Hearts are allocated to recipients primarily by medical urgency, distance between donor and recipient, and various biological traits, such as blood type.
① allotted ② withheld ③ belated ④ enlisted
8. Monica had an insatiable appetite for almond chocolate ice cream; she could never get enough.
① innocuous ② ravenous ③ frugal ④ erudite

※ 어법상 빈칸에 가장 적절한 것을 고르시오. (9-11) [각3점]

9. A complicating factor was a price hike on Mexican avocados, many of which are imported to the U.S., _____ avocados have become increasingly common in the diet.

- | | |
|---------|---------|
| ① that | ② what |
| ③ which | ④ where |

10. His greatest claim to fame is _____ for the last Olympic squad.

- | | |
|-----------------------|------------------|
| ① to be chosen | ② to choose |
| ③ to have been chosen | ④ to have chosen |

11. Had the laboratory completed their safety study by the scheduled deadline, the company _____ to delay the production of the new line of baby toys.

- | | |
|-----------------------|-----------------|
| ① would not have had | ② does not have |
| ③ would not have been | ④ did not have |

※ 밑줄 친 부분 중 어법에 맞지 않은 것을 고르시오. (12-14) [각3점]

12. We all rely ①on others while ②doing our ③jobs, and poor communication can make our workdays more difficult and unpredictable ④that they need to be.

13. After ①almost everyone ②went home last night, a strange sound ③has heard ④in the library.

14. The jailing has ①been viewed by many as a warning by China that dissent in Hong Kong will no longer ②tolerate and a sign that the courts, long ③regarded as independent, may ④be bowing to political pressure.

※ 다음 글을 읽고 물음에 답하시오. (15-16) [각3점]

(A)Why is marking up a book indispensable to reading? First, it keeps you awake. In the second place, reading, if it is active, is thinking, and thinking tends to express itself in words, spoken or written. The marked book is usually the thought-through book. Finally, writing helps you remember the thoughts you had, or the thoughts the author expressed.

If reading is to accomplish anything more than passing time, it must be active. You can't let your eyes glide across the lines of a book and come up with an understanding of what you have read. Now an ordinary piece of light fiction, like, say, *Gone with the Wind* doesn't require the most active kind of reading. The books you read for pleasure can be read in a state of relaxation, and nothing is lost. But a great book, rich in ideas and beauty, a book that raises and tries to answer great fundamental questions, demands the most active reading of which you are capable. (B)You don't absorb the ideas of John Dewey the way you absorb the crooning of Mr. Vallee. You have to reach for them. That you cannot do while you're asleep.

15. What is the correct answer to the underlined part (A)?

- ① Because it keeps your thought relaxed.
- ② Because it keeps your thought peaceful.
- ③ Because it keeps your thought flexible.
- ④ Because it keeps your thought active.

16. What is implied by the underlined part (B)?

- ① Mr. Vallee is greater than John Dewey.
- ② John Dewey is greater than Mr. Vallee.
- ③ There are different reading methods depending on different books.
- ④ To absorb great ideas from a book, a state of relaxation is needed.

※ 다음 글을 읽고 물음에 답하시오. (17-18) [각3점]

Setting out a birdfeeder is a common practice in most residential areas. By some estimations, _____, feeders provide nourishment for as many as 30 million birds in Great Britain per year. Despite this fact, however, a scientist in Switzerland has concluded that feeding birds might not be in their best interest. Some male birds, after going without food all night, need to arise early and sing a dawn chorus in order to attract a female. In general, males that sing earliest attract the best mates. When food was introduced overnight, _____, 36% of the males didn't start singing until after sunrise, indicating that the well-fed birds became lazy and more ill-prepared to mate and to defend their territories from rivals.

17. Which is the most appropriate for the blanks?

- | | |
|-------------------------------|----------------------------|
| ① for example - in particular | ② for example - however |
| ③ moreover - however | ④ in particular - moreover |

18. According to the passage, which is true?

- ① Rival male birds rarely rely on birdfeeders for nourishment.
- ② Birds that fast all night are more likely to rise and sing before sunrise.
- ③ Great Britain feeds more birds per capita than any other European nation.
- ④ The scientist's experiment was deemed incomplete because birdfeeders affected less than half of the birds studied.

※ 다음 글을 읽고 물음에 답하시오. (21-22) [각3점]

On Dec. 3, 1967, a South African surgeon named Dr. Christiaan Barnard opened a man's rib cage, took out his failing heart and replaced it with a healthy one from a brain-dead woman who had been hooked up to a ventilator. The procedure took eight hours and a team of 19 medical professionals—and when the donor heart began beating in its new body, the news ricocheted around the world. Barnard became a star overnight. “It captured people,” says Donald McRae, author of *Every Second Counts*, which chronicles the history of the first heart transplant. _____, all was not well behind the hospital doors.

Shortly after the landmark surgery, the patient, a 53-year-old grocer named Louis Washkansky, fell ill. Barnard assumed the man's body was attacking the heart—a common reaction to organ transplants—so he administered an aggressive drug regimen to shut down his immune system. However, the doctor was mistaken. It turned out Washkansky had pneumonia, and because he was given an immune-suppressing cocktail, his body could not fight the infection. Washkansky died 18 days after his surgery.

21. Which is the most appropriate for the blank?

- | | |
|-------------|------------|
| ① Instead | ② However |
| ③ Otherwise | ④ Moreover |

22. According to the passage, which is NOT true?

- ① Louis Washkansky was given a heart from a healthy woman.
- ② Dr. Christiaan Barnard performed the landmark heart surgery.
- ③ Dr. Christiaan Barnard's wrong diagnosis led Louis Washkansky to death.
- ④ The drug prescribed by Dr. Christiaan Barnard weakened Louis' immune system.

※ 다음 글을 읽고 물음에 답하시오. (23-25) [각3점]

European-American parents tend to employ one of three distinct socialization patterns, as described by Diana Baumrind. *Authoritarian parents* tend to be strict, punitive, and unsympathetic. They value obedience from children and try to shape their children's behavior to meet a set standard and to curb the children's wills. They do not encourage independence. They are detached and seldom praise their youngsters. (A)_____, *permissive parents* give their children complete freedom and lax discipline. The third group, *authoritative parents*, fall between these two extremes. They reason with their children, encouraging give and take. They allow children increasing responsibility as they get older and better at making decisions. They are firm but (B)_____. They (C)_____ but also encourage independence. Their demands are reasonable, rational, and consistent.

23. Which is the most appropriate for the blank (A)?

- ① Therefore
- ② In particular
- ③ Furthermore
- ④ In contrast

24. According to the passage, which is true?

- ① Authoritarian parents consider that children's obedience is more valuable than their independence.
- ② Authoritarian parents tend to praise their children but hardly pay close attention to them.
- ③ Permissive parents are likely to give their children full freedom and have them strictly disciplined.
- ④ Authoritative parents are likely to raise their children encouraging obedience and dependence.

25. Which is the most appropriate for the blanks (B) and (C)?

- ① understanding - set limits
- ② indifferent - demand obedience
- ③ punishing - encourage responsibility
- ④ stubborn - give freedom

※ 다음 글을 읽고 물음에 답하시오. (26-27) [각5점]

A psychiatrist reported the case of a woman who claimed that she had stomach trouble because of a frog in her stomach. She “knew” she had swallowed a frog egg while on a picnic. Her physician ridiculed the idea but she was so insistent that he finally agreed to operate for the removal of the frog. Accordingly, he sent her to a hospital to be prepared for the operation and he, at the same time, hired a small boy to catch a frog for him. To give the woman the impression that she had really had an operation, an incision was made in her abdomen, and the doctor showed her the “frog” in a bottle of alcohol, which had presumably been removed from her stomach. The woman was delighted and at once recovered, but only temporarily. Three months after the pseudo-operation, she claimed that the first frog had laid some eggs and that she now had two frogs in her stomach.

26. According to the passage, which is true?

- ① She had a frog in her stomach.
- ② The doctor removed the frog from her stomach.
- ③ She now had two frogs in her stomach.
- ④ The doctor made an incision in her abdomen.

27. Which is the main idea of the passage?

- ① Ordinary logical thinking is useless in the consideration of the ailments which are psychiatric rather than organic.
- ② Any form of invalidism can be cured by pseudo-operation.
- ③ Psychological problems should be treated by giving pseudo-medicine.
- ④ To satisfy a patient is very important in the psychiatric treatment.

※ 다음 글을 읽고 물음에 답하시오. (28-30) [각5점]

[A] Many people claim to have a bad memory, and it's true that we have trouble at times remembering where we put our house keys or recalling the names of people we've recently met. But there are those who suffer more serious memory problems, including memory loss over time or memory loss due to injury, disease, or complications of surgery. These conditions are still not very well understood by doctors and scientists.

[B] Many people experience memory loss as they age. In the past, neuroscientists—doctors who study the brain—had theories about how the brain contained only a certain number of cells and how, over time, these cells might get used up. More recent research suggests that the brain may continue to manufacture new brain cells throughout a lifetime. Also, there is now evidence that damage to the hippocampus—_____— may play an important role in memory loss. Studies conducted on patients who have suffered damage to this area of the brain show that while they can still recall memories stored before the brain was damaged, they are unable to remember new facts. In addition, diseases associated with old age (such as Alzheimer's) and other problems involving short- and long-term memory loss, are now being traced to possible damage to the hippocampus.

28. Which is the most appropriate for the blank?

- ① a part of the brain thought to be involved in only long-term memory loss
- ② an area of the brain thought to maintain a certain number of brain cells
- ③ a part of the brain thought to be important to continue to manufacture new brain cells
- ④ an area of the brain thought to be important in the process of recalling information

29. According to the passage, which is true?

- ① The researchers in the past believed that brain cells were constantly renewed.
- ② It is a mystery for someone to forget names or misplace his (her) keys occasionally.
- ③ The past research suggested that brain cells were limited in number and slowly used up over the years.
- ④ A patient with hippocampus damage can remember new facts.

30. Which is the main idea of the paragraph [B]?

- ① There are short- and long-term memories.
- ② Ideas regarding memory loss have changed over time.
- ③ Neuroscientists were confused with different methods of the research.
- ④ Doctors have proved that people who suffer damage to the hippocampus can recover.

수학 [자연계열] ①형 [문항별 5점]

31. $\lim_{x \rightarrow 0} \frac{x + \sin x}{\sqrt{\sin x + x + 1} - \sqrt{\sin^2 x + 1}}$ 의 값은?

- ① 2 ② 3 ③ 4 ④ 5

32. $f(x) = x + e^x$ 의 역함수를 $g(x)$ 라 할 때, $g'(a) = \frac{1}{2}$ 을 만족시키는 실수 a 의 값은?

- ① 0 ② 1 ③ 2 ④ 3

33. $y = \sin^{-1}x$, $x = 0$, $y = \frac{\pi}{2}$ 로 이루어진 영역을 x 축으로 회전하여 생기는 입체의 부피는?

- ① 2π ② 3π ③ 4π ④ 5π

34. $\int_0^\infty x^5 e^{-x} dx$ 의 값은?

- ① 120 ② 122 ③ 124 ④ 126

35. 다음 중 수렴하는 급수의 개수는?

(1) $\sum_{n=1}^\infty \left(\frac{2n+3}{3n+2}\right)^n$	(2) $\sum_{n=1}^\infty \frac{\cos^2 3n}{n^2 + 1}$
(3) $\sum_{n=1}^\infty (-1)^{n+1} \frac{n^2}{n^3 + 1}$	(4) $\sum_{n=1}^\infty \frac{n^n}{n!}$

- ① 1 ② 2 ③ 3 ④ 4

36. 좌표평면에서 매개변수방정식

$x = \theta - \sin \theta$, $y = 1 - \cos \theta$ 로 주어진 곡선의 $\theta = \theta_0$ 인 점에서의 접선의 기울기가 $\sqrt{3}$ 이다. 이때, 모든 θ_0 의 값의 합은? (단, $0 \leq \theta_0 \leq 2\pi$)

- ① $\frac{\pi}{3}$ ② π ③ $\frac{5\pi}{3}$ ④ $\frac{7\pi}{3}$

37. 네 점 $P(0, 0, 0)$, $Q(2, 2, -2)$, $R(2, -2, 2)$, $S(-2, 2, 2)$ 에 대하여 이웃하는 세 변이 PQ, PR, PS 인 평행육면체(parallelepiped)의 부피는?

- ① 16 ② 24 ③ 32 ④ 40

38. 곡면 $z = xe^y$ 위의 점 $(1, 0, 1)$ 에서의 접평면(tangent plane)과 yz 평면이 만나서 생기는 직선의 방정식을 $z = ay + b$ 라 하고 이 접평면과 yz 평면이 이루는 예각을 θ 라 하자. 이때, $a + b + \cos \theta$ 의 값은? (단, a, b 는 실수)

- ① $1 + \sqrt{3}$ ② $1 + \frac{\sqrt{3}}{3}$
③ $2 + \sqrt{3}$ ④ $2 + \frac{\sqrt{3}}{3}$

39. 네 평면 $x = 0$, $z = 0$, $y = x$, $x + y = 2$ 와

곡면 $z = x^2 + y^2$ 으로 이루어진 입체의 부피는?

- ① 1 ② $\frac{4}{3}$ ③ $\frac{5}{3}$ ④ 2

40. 함수 $f(x, y) = x^3 - 3xy^2 + 4y^3 - 3y^2 - 12y$ 가 극솟값을 갖는 점은?

① $(-1, -1)$ ② $(-1, 1)$
 ③ $\left(\frac{2}{3}, -\frac{2}{3}\right)$ ④ $(2, 2)$

41. 편도함수가 $\frac{\partial f}{\partial x}(x, y) = ye^{xy}$, $\frac{\partial f}{\partial y}(x, y) = xe^{xy}$ 인 함수 $f(x, y)$ 는 정의역을 $\{(x, y) \in \mathbb{R}^2 \mid 8x^3 + y^3 = 16\}$ 으로 제한했을 때 (a, b) 에서 최댓값을 갖는다. 이때, $a+b$ 의 값은?

① 1 ② 2 ③ 3 ④ 4

42. 아래 조건을 만족시키는 실수 a, b, c 에 대하여 $a(b+c)$ 의 값은?

- (1) 점 (a, b, c) 는 곡면 $S: x^2 + y^2 + z^2 = 9$ 위에 있고,
 (2) 곡면 S 위의 곡선 C 의 시작점과 끝점이 평면 $2x + y + 2z = 0$ 위에 있으면

$$\int_C a dx + b dy + c dz = 0.$$

① 0 ② 2 ③ 4 ④ 6

43. $\mathbf{F}(x, y, z) = \langle -y^3, xz^2, 3z \rangle$ 이고 S 가 네 평면 $x+y+z=1$, $x=0$, $y=0$, $z=0$ 으로 이루어진 사면체 E 의 경계일 때, 면적분 $\iint_S \mathbf{F} \cdot d\mathbf{S}$ 의 값은?
 (단, S 의 방향은 E 의 외부 쪽으로 향하는 방향)

① $\frac{1}{8}$ ② $\frac{1}{4}$ ③ $\frac{1}{2}$ ④ 1

44. 벡터장 $\mathbf{F}(x, y, z) = f(x, y, z)\mathbf{i} + g(x, y, z)\mathbf{j} + h(x, y, z)\mathbf{k}$ 에 대하여

$$\nabla f(1, 1, 1) = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$$

$$\nabla g(1, 1, 1) = 3\mathbf{i} + \mathbf{j} + 2\mathbf{k}$$

$$\nabla h(1, 1, 1) = 2\mathbf{i} + \mathbf{j} + 2\mathbf{k}$$

일 때, $\text{curl} \mathbf{F}(1, 1, 1)$ 은?

① $\mathbf{i} + \mathbf{j} + \mathbf{k}$ ② $-\mathbf{i} + \mathbf{j} + \mathbf{k}$
 ③ $-\mathbf{i} - \mathbf{j} + \mathbf{k}$ ④ $\mathbf{i} - \mathbf{j} - \mathbf{k}$

45. 행렬 $A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$ 에 대하여 A^5 의 모든 고유값(eigenvalue)의 합은?

① 276 ② 296 ③ 316 ④ 336

46. 연립일차방정식

$$\begin{cases} 2x_1 + 2x_2 - x_3 + x_5 = 0 \\ -x_1 - x_2 + 2x_3 - 3x_4 + x_5 = 0 \\ x_1 + x_2 - 2x_3 - x_5 = 0 \\ x_3 + x_4 + x_5 = 0 \end{cases}$$

의 해공간의 차원(dimension)은?

① 1 ② 2 ③ 3 ④ 4

47. 행렬 $\begin{bmatrix} 2 & -1 & 1 \\ 3 & 0 & 4 \\ -1 & 2 & -3 \end{bmatrix}$ 을 대칭행렬(symmetric matrix)과 교대행렬(skew-symmetric matrix)의 합으로 나타내면 다음과 같다.

$$\begin{bmatrix} 2 & a & 0 \\ b & 0 & c \\ 0 & d & -3 \end{bmatrix} + \begin{bmatrix} 0 & e & 1 \\ f & 0 & g \\ -1 & h & 0 \end{bmatrix}$$

이때, $abcd - efgh$ 의 값은?

① -10 ② -5 ③ 0 ④ 5

48. 역라플라스변환(inverse Laplace transform)

$\mathcal{L}^{-1}\left\{\frac{3s}{9s^2+4}\right\}$ 를 $f(t)$ 라고 할 때, $f(t)$ 의 주기는?

- ① $\frac{3\pi}{2}$ ② 2π ③ $\frac{5\pi}{2}$ ④ 3π

49. 미분방정식

$$(x^2 e^{\frac{y}{x}} - y^2)dx + xydy = 0, \quad y(1) = 0$$

의 해는?

- ① $\left(1 - \frac{y}{x}\right)e^{-\frac{y}{x}} = \ln|x| + 1$
 ② $\left(1 - \frac{y}{x}\right)e^{\frac{y}{x}} = \ln|x| + 1$
 ③ $\left(1 + \frac{y}{x}\right)e^{-\frac{y}{x}} = \ln|x| + 1$
 ④ $\left(1 + \frac{y}{x}\right)e^{\frac{y}{x}} = \ln|x| + 1$

50. $y = y(x)$ 가 미분방정식

$$y'' + y = 8\cos 2x - 4\sin x$$

$$y\left(\frac{\pi}{2}\right) = -1, \quad y'\left(\frac{\pi}{2}\right) = 0$$

의 해일 때, $y(\pi)$ 의 값은?

- ① $-\pi - \frac{8}{3}$ ② $-\pi + \frac{8}{3}$
 ③ $\pi + \frac{8}{3}$ ④ $\pi - \frac{8}{3}$