

高雄醫學大學九十六學年度學士後醫學系招生考試試題

科目: 英文

考試時間: 80 分鐘

說明: 一、選擇題用 2B 鉛筆在「答案卡」上作答, 修正時應以橡皮擦擦拭, 切勿使用修正液(帶), 未遵照正確作答方法而致電腦無法判讀者, 考生自行負責。

二、非選擇題限黑色或藍色墨水之鋼筆、原子筆或鉛筆, 在「答案卷」上作答。

三、試題、答案卡及答案卷必須繳回, 不得攜出試場。

I. Grammar and Structure: Choose the best answer to complete each sentence. 5 points.

【單選題】每題 1 分, 共 5 題, 答錯一題倒扣 0.25 分, 倒扣至本大題零分為止, 未作答, 不給分亦不扣分。

- Rarely _____ as formal medical study.
(A) do experts think of spiritual healing (B) think of experts spiritual healing
(C) do think of experts spiritual healing (D) experts do think of spiritual healing
(E) spiritual healing is thought of by experts
- _____ job seeking skills, the findings presented in Table 5 show that one-third of the subjects felt they needed more help in their interview techniques.
(A) Concerning about (B) Concerning with (C) Concerning (D) Concerned (E) Concerned about
- Weather _____, we'll go on a picnic.
(A) is permitted (B) permitted (C) permitting (D) to permit (E) it is permitted
- The barbecue party ended two hours earlier than scheduled _____ the dark clouds looming over the beach suggested a thunderstorm and heavy rain.
(A) because (B) because that (C) because of (D) because to (E) for
- The photovoltaic cell provides us with _____ energy directly from the sun, but also to solve the problem of environmental pollution.
(A) not the ability only to produce (B) the ability not only to produce
(C) the ability to produce not only (D) not only the ability to produce
(E) not the ability only to produce

II. Definition and Synonym: Choose the word or expression that is closest in meaning to the underlined word or expression in each sentence. 15 points.

【單選題】每題 1 分, 共 15 題, 答錯一題倒扣 0.25 分, 倒扣至本大題零分為止, 未作答, 不給分亦不扣分。

- The novelist's personal letters were published posthumously.
(A) following death (B) during lifetime (C) before death (D) after birth (E) after marriage
- The number of people going to the cinema seems to dwindle steadily.
(A) decline (B) disappear (C) increase (D) rise (E) accumulate
- If you throw out such innuendoes against the Minister, you will be sued for libel.
(A) nicknames (B) secrets (C) unpleasant remarks (D) lies (E) news
- The unemployed stood at street corners, dejected.
(A) angry (B) amused (C) stubborn (D) depressed (E) dumb
- The climate of Ireland is antipathetic to the growth of roses.
(A) strongly willing (B) strongly antiseptic (C) much anticipated
(D) highly recommended (E) strongly opposed
- Don't squander your money on such a cheaply made dress.
(A) conserve (B) hoard (C) converse (D) fulfill (E) lavish
- His attitude toward study impedes his progress.
(A) affects (B) effects (C) hinders (D) enhances (E) stimulates
- The teacher recognized Carol's latent musical talent.
(A) obvious (B) potential (C) persistent (D) tremendous (E) unique

14. Everyone was impressed by the sagacious speaker.
 (A) loquacious (B) confident (C) diffident (D) eloquent (E) wise
15. Florence Nightingale is the epitome of heroism and compassion.
 (A) embodiment (B) spirit (C) soul (D) vision (E) disgrace
16. Internet crime has mushroomed over the past decade, from commercial hacking to cyber terrorism.
 (A) decreased (B) disappeared (C) subsided (D) scurried (E) multiplied
17. Recently many major politicians were hospitalized for serious cases of illness. Doctors said that it was because irregular living habits, heavy smoking and drinking, as well as long periods of work under stress had taken the toll.
 (A) cost the money (B) paved the road (C) enjoyed the game (D) done the damage (E) killed the life
18. Efforts at decoding the DNA sequences of the chromosome have pushed back the frontiers of genetic research. But have we stepped onto the formerly unknown area of knowledge at our own great risks?
 (A) broken down the barriers (B) narrowed down the scope (C) broaden the range
 (D) set definite limits (E) ventured into the dangers
19. In our age of individualism, many people prefer tailor-made products though it is often difficult to acquire them and probably not convenient for use.
 (A) mass-produced (B) high-priced (C) inexpensive (D) made-of-cloth (E) specially designed
20. Though promising to reform the out-of-date mentality the bureaucracy has had in managing the state apparatus, the new ruling party soon finds that its reform faces stronger opposition than expected. The government then is forced to fall back on the old ineffective mechanism in doing its job.
 (A) criticize viciously (B) completely replace (C) rely unwillingly on
 (D) accept enthusiastically (E) treat contemptuously

III. Vocabulary and Usage: Choosing the best answer to complete each sentence. 30 points.

【單選題】每題 1.5 分，共 20 題，答錯一題倒扣 0.375 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

21. He was praised for his fairness and high _____.
 (A) inferiority (B) integration (C) integrity (D) intimacy (E) ingenuity
22. The speaker spent a lot of time on one simple question. His explanation was so _____ that we hardly see the point clearly.
 (A) coherent (B) crucial (C) vicious (D) various (E) lengthy
23. Dreams are _____ in and of themselves, but, when combined with other data, they can tell us much about the dreamer.
 (A) startling (B) uninformative (C) uncontrollable (D) unregulated (E) harmless
24. The discovery of new medicine is an important _____ in the fight against cancer.
 (A) commitment (B) demonstration (C) outbreak
 (D) breakthrough (E) interpretation
25. Ching style furniture, with its fine _____ and inlaid shell patterns, is the favorite of older folks from south and central Taiwan.
 (A) workmanship (B) penmanship (C) supplement (D) machination (E) settlement
26. With changing social structures in Taiwan, many businessmen copy the bright and _____ style of the fast food chains with their standardized products and decor; they have even taken beef noodle soup into international grade hotels.
 (A) hygienic (B) unsanitary (C) infected (D) impure (E) harmful
27. Restaurants can back this up with a standardized recipe for the item and a(n) _____ analysis of the recipe.
 (A) habitual (B) ludicrous (C) absurd (D) delicious (E) nutritional
28. Overseas Chinese blend into a local society through _____ and adaptation to the local language and ways of life.
 (A) maturity (B) intermarriage (C) collaborator (D) demonstration (E) excursion
29. When the orange trees are _____ there is a sweet fragrance in the air.
 (A) blooming (B) blossoming (C) withering (D) decaying (E) aging
30. Since September 11 many New Yorkers have become _____ at the mere sight of a plane passing over Manhattan.
 (A) scarred (B) indifferent (C) apathetic (D) spooked (E) mild
31. The Arabian Kingdom would support the Sunni minority in Iraq if they were in _____ when the situation in Iraq fell apart.
 (A) plenty (B) safety (C) extinction (D) raid (E) jeopardy

32. _____, nearly two out of three cancer patients in the United States live more than five years after their diagnosis.
 (A) In the past (B) From now on (C) So far (D) At the present time (E) A few years ago
33. Ideologies and mentalities are _____ matters, but they can exert powerful influence on material world and are thus harder to break.
 (A) incredible (B) intangible (C) supernatural (D) insensible (E) concrete
34. A politician is often accused of _____, but, in order to win people's support, s/he is usually forced to boast about him/herself and make promises that can hardly be fulfilled.
 (A) hypocrisy (B) enthusiasm (C) sincerity (D) indifference (E) foolery
35. _____ for the tattered clothes he wore and a one-thousand-dollar bill in the pocket, he owned nothing else when he first came to Taipei.
 (A) Save (B) If (C) Unless (D) Caring (E) Despite
36. He always sees me as his _____; he hardly talks to me and is quite unfriendly.
 (A) beneficiary (B) antagonist (C) avert (D) benign (E) avocation
37. Efforts made on conservation would ensure that _____ environments can be protected from development and damage.
 (A) consummate (B) biodegradable (C) pristine (D) adequate (E) chronic
38. Writers should always try to avoid _____ phrases, because they would bore readers.
 (A) epidemic (B) evocative (C) hackneyed (D) sedentary (E) profuse
39. She is _____ in that she tends to think of others rather than herself.
 (A) ostentatious (B) staunchest (C) fickle (D) repulse (E) altruistic
40. John was angry with his daughter, and it took all her charm to _____ him.
 (A) defuse (B) placate (C) crave (D) subsidize (E) deviate

IV. Reading Comprehension: Choose the best answer. 30 points.

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Another medical technique that has recently become popular is hypnosis. In sleep, a loss of awareness occurs; in hypnosis there is a highly concentrated but relaxed awareness, which can be like daydreaming. When used as "hypnoanesthesia," hypnosis does not stop the pain process; rather, the perception of the pain is altered. Only patients who are able to undergo deep hypnosis, about one quarter of the population, are appropriate for this technique in surgery. Hypnosis often provides very ill patients with relief they can no longer obtain from drugs or surgery.

41. According to the passage, hypnosis is valuable because it
 (A) is more relaxing than sleep. (B) is better than drugs in killing pain.
 (C) can help stop the spread of a serious illness. (D) is an important tool for easing pain.
 (E) is a popular way of killing pain.
42. According to the passage, who can be successfully hypnotized for surgery?
 (A) A minority of the population. (B) Almost everyone.
 (C) Those who no longer use drugs. (D) Those with special medical needs.
 (E) Those who need to take surgery.
43. According to the passage, hypnosis reduced pain in surgical patients because the
 (A) patient can concentrate on something else. (B) awareness of the pain is changed.
 (C) pain is removed from consciousness. (D) patient is too relaxed to feel pain.
 (E) patient feels like they are daydreaming.
44. According to the passage, hypnosis is unlike sleep because in hypnosis
 (A) there are no dreamlike states.
 (B) awareness is not decreased.
 (C) the person does not remember anything afterwards.
 (D) there is a complete loss of consciousness.
 (E) there is a complete loss of awareness.

Plagiarism is the academic infraction of choice. How can it not be, though? Information is easily available from the Internet, especially from sites like Wikipedia. Old term papers are being sold online. Because the Internet provides easy information fast, the temptation to click "copy/paste" and pull in quotes from a Web site without attribution is great. But students still get caught because faculty members can search for familiar phrases or quotes to root out plagiarism.

Cheating is on the rise in universities. Is it because students aren't learning the material? Or is it because their learning and work ethic are so different from their professors that working together to solve a problem is no longer that serious an infraction? Remember that teamwork has been emphasized to Net Geners since the first day of kindergarten. Businesses are also looking for graduates who can work effectively in teams.

Based on the very social nature of Net Geners and the tremendous amount of information available to students these days at the touch of a button, the traditional definition of cheating is changing. How faculties assess students is changing as well. Faculties still give written exams (in English, it is still a certainty), but they must be ever more vigilant to catch the cheating student. Cell phones and text messaging have allowed students to text back and forth between each other, conferring through the airwaves on exam questions. Because of emerging technologies, faculties have to adapt their classes and how they assess students in order to uphold academic integrity.

45. What is the main idea of the above text?
(A) The traditional definition of cheating is changing for Net Geners.
(B) There is no way for Net Geners to cheat in written exams.
(C) Cheating is on the rise in universities.
(D) Plagiarism is the academic infraction of choice.
(E) Teamwork has been emphasized to Net Geners.
46. What instruments were applied by Net Geners in cheating in written exams?
(A) Cell phones and e-mail. (B) Cell phones and text messaging.
(C) Voiced conferencing and text messaging. (D) Blogs and text messaging.
(E) Blogs and e-mail.
47. Why is Wikipedia used by students frequently?
(A) It is cheap. (B) It provides easy information fast.
(C) It provides the PDF version. (D) It provides an MSN system.
(E) It is very academic.
48. Why do faculties have to adapt their classes according to the text?
(A) Because of the need for conferring with students on the network.
(B) Because of heavy grading of written exams.
(C) Because of the change in the class size.
(D) Because of emerging technologies.
(E) Because of increasing faculty fellows.

Scientists disagree about the place of instinct in human behavior. Sociobiologists argue that even complicated forms of human behavior can have an instinctive basis. They believe we have an inborn urge to propagate our own genes or those of our biological relatives. Social customs that enhance the odds of such transmission survive in the form of kinship bonds, courtship rituals, altruism, taboos against female adultery, and many aspects of social life. Other social scientists have argued that human behavior can be explained solely by learning. Psychologists today generally take a middle path. They acknowledge that human behavior is influenced by our biological heritage, but most doubt that either imprinting or true instincts occur in human beings.

49. The author's attitude toward the subject of human behavior is
(A) condescending. (B) neutral. (C) humorous. (D) negative. (E) deprecating.
50. It can be concluded from the passage that
(A) social scientists agree on a single theory of human behavior.
(B) today's psychologists are not interested in exploring human behavior.
(C) human behavior is influenced by a variety of factors.
(D) the desire to procreate is learned behavior.
(E) adultery is caused solely by one's genes.

51. This passage would most likely be required reading in which of the following courses?
(A) biology (B) philosophy (C) literature (D) geography (E) psychology
52. The paragraph preceding this passage is most likely about
(A) imprinting (B) courtship rituals (C) taboos (D) instincts (E) altruism

American parents are bugging their children's telephones, installing secret cameras in clock radios and sending strands of hair retrieved from pillows for analysis at drug laboratories.

They are resorting to Cold War espionage techniques and science to fight drug and alcohol abuse, which many turned into a way of life during their hippy days a generation ago.

Baby Boomers are hiring companies to bring sniffer dogs into their homes to track down traces of dope. Radio shops sell home surveillance equipment. Telephone bugs cost £20, and you can buy a chemical analysis kit on the Internet for £45 if you want proof, from the hair in your daughter's comb, for example, that she is taking drugs. Aerosol sprays and special chemical-soaked cotton wipes, as simple as home pregnancy kits, are available to see if there is cannabis or other narcotic residues on car seats or other surfaces.

Parental spies run the risk, if caught, of destroying the remnants of trust in their relationship with their children. But the trend is growing. Most American teenagers have telephones and televisions in their rooms, and many have computers and Internet access. Parents feel that they should be able to get to their children, even surreptitiously, because the rest of the world does.

53. What does it mean to "bug" a telephone, as inferred from the article?
(A) To tamper the normal functions of telephone, so one can neither make or receive calls.
(B) To listen in a conversation on the phone without being noticed by the speakers.
(C) To make calls secretly not through one's own line, so they are charged on others.
(D) To install a meter on a telephone, so the time and money spent on calls are indicated.
(E) To bother a phone conversation with buzzing noises, as if a bug stayed in the receiver.
54. In the seemingly twisted situation described in the article, what comparison below is NOT similar to the ways these parents are actually treating their children?
(A) As if a detective were trying to uncover criminal evidence to catch a murder suspect.
(B) As if a custom officer were trying to discover contraband in a passenger's luggage.
(C) As if a national security officer were trying to follow an enemy spy's secret activities.
(D) As if a forensic technician were running an examination of autoptic evidence.
(E) As if a teacher were trying to evaluate the students' academic performances.
55. Which statement below is correct about the attitudes of the American parents and children toward drug and alcohol abuse?
(A) Both generations regard the activity as a way of life, and there is no need to worry about it.
(B) The parents have usually regarded the activity as a problem since they were young, but their children now regard it as only a way of life.
(C) The parents actually regarded the activity as only a way of life when they were young, but they now grow anxious when their children just follow what the parents once did.
(D) The parents believe that, as baby boomers, they had the rights to try the illegitimate activity which their children should be denied access to.
(E) Both generations regard the activity as illegitimate and uncommon, and the fuss the parents have made over their children is much ado about nothing.
56. What is the parents' main excuse for adopting the drastic measures described above in monitoring their children?
(A) The parents think that they need to know what's going on with their children when the latter are exposed to all kinds of influences from the outside world.
(B) The parents don't believe there is such thing as respect for the children's privacy.
(C) While the media are advertising the high-tech surveillance equipment, the parents cannot resist the temptation to try it.
(D) The parents are too busy to watch over their children in traditional, time-consuming ways.
(E) The parents are simply very curious about their children's activities though they do not seriously believe that their children will get into troubles.

Chinese-American architect, I. M. Pei, has brought the past into the present. He designed and built a large pyramid as the Egyptians did in the past. However, he used new high technology materials and processes. Pei's pyramid is the new main entrance to the Louvre Museum in Paris, France.

Pei used pioneering techniques to develop the pyramid's glass curtain wall. The pyramid is made of the special high-strength optical-quality glass that makes such walls possible. The see-through glass walls give the structure a sense of transparency and lightness. Many other elements of the pyramid are also technologically advanced.

Pei's glass pyramid is the first modern addition to the Louvre, which was originally a palace for the kings of France and now houses one of the world's largest and most important art collections.

The pyramid has been criticized by people who are puzzled by the unexpected combination of this high-tech pyramid and the surrounding nineteenth-century stone buildings in a traditional style. However, Pei felt the project was a chance to integrate artistic design with his commitment to urban renewal—a plan to renew the city and help it meet current needs. Pei explained his choice of the pyramid as the “simplest geometric shape, the best.” The new addition to the Louvre is not merely an entrance; it is built above a huge below-ground network of services and passages. Pei hoped to revitalize the Louvre and give it new life and energy. His goal was to make it easy for people to enter the Louvre and to make the Louvre a part of the life of present-day Paris.

57. Why did Pei choose a pyramid as an addition to the Louvre?
- (A) The Louvre held a huge collection of Egyptian art.
 - (B) French government wanted Pei to choose this figure.
 - (C) Pei himself thought that the figure was simple and beautiful.
 - (D) High-tech materials allowed Pei to experiment with the figure.
 - (E) Pei hated old royal regimes and wanted to disgrace the Louvre with the modern addition.
58. Why did some people criticize Pei's addition to the Louvre?
- (A) The stone walls of the Louvre might accidentally break the glass walls of the pyramid.
 - (B) Egypt was France's enemy, and it was unpatriotic to have a pyramid built beside the Louvre.
 - (C) The glass pyramid cost too much, especially with its high-tech materials.
 - (D) The modern addition and the old building did not seem to fit very well.
 - (E) Egyptians did not like the symbol of their nation erected as a decoration to their enemy's royal palace.
59. Which detail of the pyramid's design BEST showed Pei's ideal of urban renewal?
- (A) The pyramid was built with high-tech materials.
 - (B) The designer of the pyramid was a Chinese-American, not a Frenchman.
 - (C) Part of the Louvre was demolished when the pyramid was added to it.
 - (D) Besides being an entrance, there are convenient passageways and modern services housed under the pyramid.
 - (E) The symbolic significance of pyramid in Egyptian culture is rebirth.
60. Which statement serves best as the main idea of the passage?
- (A) Pei's glass pyramid is the first modern addition to the Louvre.
 - (B) Pei brought the past into the present by building a large pyramid like the ancient Egyptians but with modern materials and processes.
 - (C) The pyramid had been criticized by some people because it doesn't fit in with the surrounding buildings.
 - (D) Pei's pyramid is the new main entrance to the Louvre.
 - (E) Pei displays his cosmopolitanism by integrating the ideas of French, Egyptian, and Chinese cultures into the glass pyramid.

V. Writing. Write an essay in which you argue for or against the following statement (in 200 words). 20 points.

Universities should require every student to take a variety of courses outside the student's field of study because acquiring knowledge of various academic disciplines is the best way to become truly educated.

You should use your own ideas, knowledge, reasoning, and experience and support your arguments with examples.

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科目:普通生物學

考試時間: 80 分鐘

說明:一、選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，切勿使用修正液(帶)，未遵照正確作答方法而致電腦無法判讀者，考生自行負責。

二、試題及答案卡必須繳回，不得攜出試場。

I. 【單選題】1-50 題，每題 1 分，共計 50 分。答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答時，不給分亦不扣分。

1. Chemolithoautotroph means
(A) energy source: light; carbon source: CO₂.
(B) energy source: inorganic chemicals; carbon source: CO₂.
(C) energy source: light; carbon source: organic compounds.
(D) energy source: organic compounds; carbon source: organic compounds.
(E) energy source: inorganic chemicals; carbon source: inorganic chemicals.
2. Which of the following is **NOT** a force that changes gene frequencies for populations?
(A) mutation. (B) random genetic drift. (C) migration.
(D) genome size. (E) natural selection.
3. Which of following characteristics can distinguish protostome from deuterostome development?
(A) spiral cleavage. (B) coelom formation.
(C) fate of the blastopore. (D) A and B. (E) A, B and C.
4. In plants, the male gametangium, a moist chamber in which gametes develop, is called
(A) antheridium. (B) archegonium. (C) sporangium. (D) angiosperms. (E) gametophore.
5. What do budding and fragmentation have in common?
(A) Both are types of asexual reproduction. (B) Both produce large numbers of offspring.
(C) Both occur in sea stars. (D) Both involve mitosis.
(E) Both A and D.
6. Which of the following is **INCORRECTLY** paired?
(A) hair cell-mechanoreceptor. (B) muscle spindle-mechanoreceptor.
(C) gustatory receptor-chemoreceptor. (D) cone cell-photoreceptor.
(E) pacinian corpuscles-chemoreceptor.
7. Which of the following statements concerning the components of ATP synthase on inner membrane of the mitochondrion is **FALSE**?
(A) A rotor within the membrane spins clockwise when H⁺ flows past it down the H⁺ gradient.
(B) A stator anchored in the membrane holds the knob stationary.
(C) A rod extending into the knob also spins, activating catalytic sites in the knob.
(D) A rod as a channel is used to drive the transport of ATP molecules against a concentration gradient.
(E) The catalytic sites in the stationary knob join inorganic phosphate to ADP to make ATP.
8. What is the reason for fluid being forced out of systemic capillaries at the arteriole end?
(A) The osmotic pressure of the interstitial fluid is greater than that of the blood.
(B) The hydrostatic pressure of the blood is less than that of the interstitial fluid.
(C) The hydrostatic pressure of the blood is greater than the osmotic pressure of the blood.
(D) The osmotic pressure of the interstitial fluid is greater than the hydrostatic pressure of the blood.
(E) The osmotic pressure of the blood is greater than the hydrostatic pressure of the interstitial fluid.
9. Which of the following is a correct sequence of processes that takes place when a flowering plant reproduces?
(A) meiosis-fertilization-ovulation-germination.
(B) fertilization-meiosis-nuclear fusion-formation of embryo and endosperm.
(C) meiosis-pollination-nuclear fusion-formation of embryo and endosperm.
(D) growth of pollen tube-pollination-germination-fertilization.
(E) meiosis-mitosis-nuclear fusion-pollen.

10. When an illuminated rod or cone stimulates a horizontal cell, the horizontal cell inhibits more distant photoreceptors and bipolar cells that are not illuminated, making the light spot appear lighter and the dark surrounding even darker. This form of integration, called
- (A) horizontal inhibition. (B) horizontal amplification. (C) lateral inhibition.
(D) lateral amplification. (E) cone stimulation.
11. Lipolysis and gluconeogenesis are stimulated when
- (A) insulin and glucagon are both decreasing.
(B) insulin and glucagon are both increasing.
(C) insulin is increasing and glucagon is decreasing.
(D) insulin is decreasing and glucagon is increasing.
(E) glucagon is not associated with lipolysis.
12. Consider this pathway: bitter molecules → G-protein → phospholipase C → IP₃ → raised [Ca²⁺] → cellular response. Identify the second messenger.
- (A) G-protein. (B) IP₃. (C) Ca²⁺. (D) B and C. (E) A, B and C.
13. The thick band of nerve fibers that connect the right and left cerebral hemispheres in placental mammals, enabling the hemispheres to process information together, is called
- (A) corpus callosum. (B) hippocampus. (C) suprachiasmatic nuclei. (D) limbic system.
(E) reticular formation.
14. The capillary system that serves the loop of Henle, is called
- (A) vas deferens. (B) macula densa. (C) vasa recta. (D) juxtaglomerular apparatus.
(E) henle plexus.
15. Which of the following occurs when a skeletal muscle fiber contracts?
- (A) The myosin head is bound to ATP.
(B) The myosin tail binds to actin, forming a cross-bridge.
(C) Releasing ADP and Pi, myosin fixes the thin filament.
(D) The tropomyosin is activated by ATP hydrolysis.
(E) Ca²⁺ entry into sarcoplasmic reticulum.
16. The mechanism that is used by *Drosophila melanogaster* to prevent the shortening of the chromosome ends is
- (A) transposition. (B) elongating the ends by telomerase. (C) apoptosis.
(D) signal transduction. (E) recombination and mismatch repair.
17. Which of the following statements on eukaryotic mRNA is **NOT** true?
- (A) mRNA is usually capped at the 5' terminus.
(B) mRNA always contains a poly-A tail.
(C) Translation usually starts from the first AUG codon from the 5' terminus.
(D) mRNA often contains an AAUAAA sequence in the 3' region as a polyadenylation signal.
(E) mRNA does not contain a Shine-Dalgarno sequence for translation initiation.
18. Which of the following processes is most directly driven by light energy?
- (A) Creation of a pH gradient by pumping protons across the thylakoid membrane.
(B) Carbon fixation in the stroma.
(C) Reduction of NADP⁺ molecules.
(D) Removal of electrons from chlorophyll molecules.
(E) ATP synthesis.
19. Which of the following does **NOT** occur during the Calvin cycle?
- (A) carbon fixation. (B) oxidation of NADPH. (C) release of oxygen.
(D) regeneration of the CO₂ acceptor. (E) consumption of ATP.
20. Which of the following statements is most compatible with the “source-sink” concept of sugar transport in the phloem?
- (A) Sugars are loaded at the sink.
(B) Sugars move from the sink to the source in the phloem.
(C) Sugars are unloaded at the source.
(D) Developing young leaves are sinks and fully developed leaves are sources.
(E) Transport is always unidirectional in the phloem.
21. The completion of the S phase of the cell cycle of a mammalian cell is marked by all of the following **EXCEPT**:
- (A) Histone content per cell is double that of cells in G₁.
(B) In replicated DNA, newly incorporated bases are paired with parental bases.
(C) Each replicated chromosome has four telomeres.
(D) Sister chromatids disjoin from one another.
(E) The nucleus contains the equivalent amount of DNA of a tetraploid cell in G₁.

22. Collenchyma cells can be recognized by
 (A) lignin in the cell walls. (B) the presence of chloroplasts.
 (C) their unevenly thickened cell walls. (D) the lack of nuclei at maturity.
 (E) large central vacuoles.
23. Which of the following is a land plant that produces flagellated sperm and has a sporophyte-dominant life cycle?
 (A) fern. (B) moss. (C) liverwort. (D) charophycean. (E) hornwort.
24. The immediate, direct effect of auxin in cell elongation, according to the acid growth hypothesis, is to
 (A) increase the hydrostatic pressure in cells, stretching their walls.
 (B) activate ATP-driven proton (H^+) pumps, and result in an accumulation of H^+ in cytoplasm.
 (C) shift the pH and thus activate enzymes that break the hydrogen bonds.
 (D) move water into vacuoles.
 (E) activate the synthesis of new cytoplasm.
25. A precursor in the synthesis of the peptidoglycan of bacterial cell walls is UDP-:
 (A) galactose. (B) glucose. (C) glucuronic acid.
 (D) *N*-acetylglucosamine. (E) penicillin.
26. _____ ecologists would study the distribution of *Taiwania cryptomerioides* in mountain areas of Taiwan.
 (A) Population (B) Community (C) Ecosystem (D) Behavioral (E) Landscape
27. Which of the following best describes directional selection?
 (A) Two or more phenotypes are common and drive diversity.
 (B) It occurs when one extreme phenotype has an advantage over all other phenotypes.
 (C) Larger individuals in a population have higher rates of survival than average and small individuals.
 (D) All of the above.
 (E) B and C are correct.
28. In a _____ distribution, many sample plots will contain few or no individuals while other plots will contain a large number.
 (A) clumped (B) regular (C) random (D) uniform (E) none of the above
29. Groups of plant or animal subpopulations which are spatially isolated but exchange individuals is called a
 (A) metapopulation. (B) community. (C) clumped distribution.
 (D) corridor. (E) none of the above.
30. Which of the following situations dose **NOT** increase species diversity in a community?
 (A) predation by keystone species. (B) habitat heterogeneity.
 (C) competitive exclusion. (D) moderate disturbances.
 (E) immigration of species.
31. Which of the following is an example of Müllerian mimicry?
 (A) Two species of unpalatable butterfly that have the same color pattern.
 (B) A day-flying hawkmoth that looks like a wasp.
 (C) A katydid whose wings look like a dead leaf.
 (D) Two species of rattlesnake that both rattle their tails.
 (E) Two species of moths with wing spots that look like owl's eyes.
32. Which of the following is **NOT** a shared characteristic of all chordates?
 (A) dorsal, hollow nerve cord. (B) notochord. (C) post-anal tail. (D) pharyngeal slits.
 (E) four-chambered heart.
33. Natural selection is based on all of the following except
 (A) inheritance of acquired characteristics.
 (B) the fittest individuals leave the most offspring.
 (C) variation exists within populations.
 (D) populations tend to produce more individuals than the environment can support.
 (E) differential reproductive success within populations.
34. In which specific way does the founder effect lead to changes in gene frequency?
 (A) Small populations get large and then small again.
 (B) By chance alone, the descendants are not genetically representative of the ancestral population.
 (C) Involves homozygous ancestral populations that become heterozygous.
 (D) Natural selection acts as a principal cause of change in the process.
 (E) Depends on the importance of nonneutral mutations.

35. Reproduction isolation resulting from behavioral changes that inhibit mating between neighbors can lead to
 (A) hybrid vigor. (B) allopatric speciation.
 (C) sympatric speciation. (D) stabilizing selection.
 (E) directional selection.
36. Two islands that are similar in size and have the same distance from the mainland have very different species richness. According to the theory of island biogeography, the difference in species richness is probably due to
 (A) area effect. (B) distance effect. (C) habitat effect. (D) target effect. (E) rescue effect.
37. Which of the following is **NOT** true about estuaries?
 (A) Estuaries have lower net primary production than continental shelf.
 (B) Estuaries are susceptible to pollution and commercial developments by humans.
 (C) Estuaries support a variety of animal life that humans consume.
 (D) Estuaries are often bordered by mudflats and salt marshes.
 (E) Estuaries contain waters of varying salinity.
38. The perceived pitch of a sound depends on
 (A) vibrations of the tympanic membrane being transmitted through the incus.
 (B) vibrations of the oval window creating wave formation in the fluid of the vestibular canal.
 (C) the region of the basilar membrane where the signal originated.
 (D) A and C only.
 (E) A, B, and C.
39. Neurons at rest are not at the equilibrium potential for K^+ because the cell membrane is
 (A) only permeable to K^+ . (B) slightly permeable to Na^+ .
 (C) not permeable to Na^+ . (D) not permeable to K^+ .
 (E) only permeable to Na^+ .
40. Which of the following mechanisms for osmoregulation or nitrogen removal is **INCORRECTLY** paired with its corresponding animal?
 (A) metanephridium-earthworm. (B) Malpighian tubule-insect. (C) kidney-frog.
 (D) flame bulb-snake. (E) direct cellular exchange-marine invertebrate.
41. Which of the following respiratory systems is not closely associated with a blood supply?
 (A) vertebrate lungs. (B) fish gills. (C) tracheal systems of insects.
 (D) the outer skin of an earthworm. (E) the parapodia of a polychaete worm.
42. Where do air-breathing insects carry out gas exchange?
 (A) in specialized external gills. (B) in specialized internal gills.
 (C) in the alveoli of their lungs. (D) across the membranes of cells.
 (E) across the thin cuticular exoskeleton.
43. A mutation results in a cell that no longer produces a normal protein kinase for the M phase checkpoint. Which of the following would likely be the immediate result of this mutation?
 (A) The cell would prematurely enter anaphase. (B) The cell would never leave metaphase.
 (C) The cell would never enter metaphase. (D) The cell would never enter prophase.
 (E) The cell would undergo normal mitosis, but fail to enter the next G_1 phase.
44. When nutrients are supplied to a cell, the last fluid through which they must pass before encountering the plasma membrane is the
 (A) plasma. (B) interstitial fluid. (C) blood. (D) intracellular fluid. (E) cerebrospinal fluid.
45. During meiosis II,
 (A) cytokinesis results in the formation of a total of two cells.
 (B) sister chromatids of each chromosome are separated from each other.
 (C) homologous chromosomes pair up.
 (D) homologous chromosomes separate.
 (E) sister chromatids exchange parts.
46. Which of these is **NOT** found in the epidermis?
 (A) stratified epithelium. (B) blood vessels. (C) tight cell junctions.
 (D) keratin. (E) melanin.
47. The first vertebrates are most closely related phylogenetically to which of the following phyla?
 (A) Echinodermata. (B) Annelida. (C) Mollusca. (D) Arthropoda. (E) None of these.

48. The classic Hershey and Chase (1952) experiment which offered evidence in support of DNA being the genetic material in bacteriophage made use of which of the following labeled components?
 (A) phosphorus and sulfur. (B) phosphorus and nitrogen.
 (C) phosphorus and oxygen. (D) nitrogen and oxygen.
 (E) nitrogen and sulfur.
49. Which of the following terms best characterizes catabolite repression associated with the lactose operon in *E. coli*?
 (A) inducible system. (B) repressible system. (C) negative control.
 (D) positive control. (E) constitutive.
50. Developmental similarities observed in most vertebrates are probably due to
 (A) chance. (B) the similar environments in which they live.
 (C) homeoboxes. (D) their phylogenetic histories.
 (E) homeoboxes and their phylogenetic histories.

II. 【單選題】 51-75 題，每題 2 分，共計 50 分。答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答時，不給分亦不扣分。

51. Which of the following statements concerning biogeochemical cycles is **NOT** correct?
 (A) Plants and algae can use two inorganic forms of nitrogen: ammonium and nitrate.
 (B) Photosynthesis by plants and phytoplankton removes substantial amounts of atmospheric CO₂ each year.
 (C) The largest accumulations of phosphorus are in sedimentary rocks of marine origin. There are also large quantities of phosphorus in soils, in the oceans and in organisms.
 (D) Under anaerobic conditions, nitrifying bacteria use NO₃⁻ in their metabolism instead of O₂, releasing N₂ in a process known as nitrification.
 (E) The major pathway for nitrogen to enter an ecosystem is via nitrogen fixation, the conversion of N₂ by bacteria to forms that can be used to synthesize nitrogenous organic compounds.
52. The breathing in human is controlled by all of the following mechanisms **EXCEPT**
 (A) The sensors in the walls of the aorta and carotid arteries in the neck detect changes in blood pH and send nerve impulses to the medulla.
 (B) The sensors in the aorta and carotid arteries also detect changes in O₂ levels in the blood and signal the medulla to increase the breathing rate.
 (C) Nerves from a breathing control center in the medulla oblongata of the brain send impulses to the diaphragm and rib muscles, stimulating them to contract and causing inhalation.
 (D) Sensors in the medulla detect changes in the pH of the blood and interstitial fluid bathing the surface of the brain.
 (E) The control center in the medulla sets the basic rhythm, and a control center in the pons moderates it, smoothing out the transitions between inhalations and exhalations.
53. Which of the following statements concerning appetite-regulating hormones is **NOT** correct?
 (A) Leptin suppresses appetite as its level increase.
 (B) The hormone PYY, secreted by the small intestine after meals, acts as an appetite suppressant.
 (C) Insulin can suppress appetite by acting on the brain.
 (D) Ghrelin is one of the signals that triggers feelings of hunger as mealtimes approach.
 (E) Amino acids or fatty acid in the duodenum trigger the release of Cholecystokinin (CCK), an appetite suppressant.
54. Which of the following statements about both C₄ and crassulacean acid metabolism (CAM) plant is **INCORRECT**?
 (A) Both adaptations are characterized by preliminary incorporation of CO₂ into organic acids, followed by transferring of CO₂ to the Calvin cycle.
 (B) In C₄ and CAM plants, carbon fixation and the Calvin cycle occur in the same cells at different time.
 (C) The C₄ and CAM pathways are two evolutionary solutions to the problem of maintaining photosynthesis with stomata partially or completely closed on hot, dry days.
 (D) The C₄ plants are so named because they preface the Calvin cycle with an alternate mode of carbon fixation that forms a four-carbon compound as its first product.
 (E) The mesophyll cells of CAM plants store the organic acids they make during the night in their vacuoles until morning, when the stomata close.
55. Which of following statements concerning the mechanism of long-term potentiation (LTP) in the vertebrate brain is **INCORRECT**?
 (A) LTP involves an increase in the strength of synaptic transmission that occurs when presynaptic neurons produce a brief, high-frequency series of action potentials.
 (B) The presynaptic neuron release acetylcholine (ACh). ACh binds to its receptor, opening the receptor channel and depolarizing the postsynaptic membrane.
 (C) Ca²⁺ diffuses into the postsynaptic neuron. Ca²⁺ initiates the phosphorylation of the receptor, making them more responsive.
 (D) Ca²⁺ stimulates the postsynaptic neuron to produce NO.
 (E) NO diffuses into the presynaptic neuron, causing it to release more neurotransmitters.

56. In what order would you pass through tissues when moving from the pith to the epidermis in a plant possessing secondary vascular tissue?
- (A) primary phloem → primary xylem → secondary phloem → secondary xylem.
 (B) primary xylem → secondary xylem → vascular cambium → secondary phloem → primary phloem.
 (C) primary phloem → secondary phloem → secondary xylem → primary xylem.
 (D) secondary xylem → primary xylem → primary phloem → secondary phloem.
 (E) secondary phloem → primary phloem → primary xylem → secondary xylem.
57. Following clear-cutting of a deciduous forest several hundred years ago, the land was colonized by herbaceous species which, over time, were replaced largely by shrubs, then by forest trees. Assuming the growth of the shrubs and trees was enhanced by the soil-holding properties of the herbaceous plants, which of the following processes best describes the progression from herbaceous plants to forest trees?
- (A) secondary succession; inhibition. (B) primary succession; toleration.
 (C) secondary succession; facilitation. (D) primary succession; inhibition.
 (E) primary succession; facilitation.
58. Which of the following statements about fire is **INCORRECT**?
- (A) Fire is one kind of disturbance.
 (B) Communities such as grasslands and chaparrals depend on periodic fire to maintain.
 (C) Fire suppression by humans may increase the severity of the fires.
 (D) Fire suppression is necessary for the protection of threatened and endangered forest species.
 (E) Secondary succession follows a fire.
59. Which of the following is the **CORRECT** sequence that occurs during the excitation and contraction of a muscle cell?
1. Tropomyosin shifts and unblocks the cross-bridge binding sites.
 2. Calcium is released and binds to the troponin complex.
 3. Transverse tubules depolarize the sarcoplasmic reticulum.
 4. The thin filaments are ratcheted across the thick filaments by the heads of the myosin molecules using energy from ATP.
 5. An action potential in a motor neuron causes the axon to release acetylcholine, which depolarizes the muscle cell membrane.
- (A) 5, 2, 3, 1, 4 (B) 2, 1, 3, 5, 4 (C) 2, 3, 4, 1, 5 (D) 5, 3, 1, 2, 4 (E) 5, 3, 2, 1, 4
60. Tetanus refers to
- (A) the partial sustained contraction of major supporting muscles.
 (B) the all-or-none contraction of a single muscle fiber.
 (C) a stronger contraction resulting from the activation of multiple motor units.
 (D) a smooth and sustained contraction, resulting from wave summation.
 (E) a state of muscle fatigue caused by the depletion of ATP and the accumulation of lactate.
61. Which of the following best describes how an axon grows toward its target cell?
- (A) The axon grows in a direct path, attracted by signal molecules released by target cells.
 (B) Cells along the growth path release signal molecules that either attract or repel the axon, and the interaction of CAMs on the growth cone and neighboring cells may provide tracks that guide axon growth.
 (C) Nerve growth factor released by astrocytes stimulates a neural progenitor cell to differentiate into a neuron, whose axon then grows toward an increasing concentration of signal molecules.
 (D) The axon produces growth-promoting proteins only in its growth cone, causing the axon to grow in an outward direction toward its target cells.
 (E) Glia first migrate to the target cells, leaving a trail of CAMs along the path that the growth cone of the axon follows.
62. If an egg cell contained EDTA, a chemical that binds calcium and magnesium, what effects would this have on reproduction?
- (A) The acrosomal reaction would be blocked.
 (B) The fusion of sperm and egg nuclei would be blocked.
 (C) The fast block to polyspermy would not occur.
 (D) The fertilization envelope would not be formed.
 (E) The zygote would not contain maternal and paternal chromosomes.
63. Which of the following would probably have the *greatest* effect on convergent extension?
- (A) Stopping DNA synthesis. (B) Stopping mRNA synthesis.
 (C) Releasing an enzyme that digests glycoproteins. (D) A and B only.
 (E) A, B and C.
64. Which of the following is common to both avian and mammalian development?
- (A) holoblastic cleavage. (B) epiblast and hypoblast. (C) trophoblast.
 (D) yolk plug. (E) gray crescent.

65. How do the estrous and menstrual cycles compare?
- (A) Endometrial bleeding occurs during the menstrual cycle; the endometrium is reabsorbed by the uterus during the estrous cycle.
 - (B) There are more pronounced behavioral changes during menstrual cycles than during estrous cycles.
 - (C) There are stronger effects of season and climate on menstrual cycles.
 - (D) Copulation can only occur during the period surrounding ovulation in both the estrous and menstrual cycles.
 - (E) The length of both cycles averages 28 days.
66. A toxin that specifically blocks active transport in the loop of Henle might result in which of the following?
- (A) A decrease in the interstitial concentration of NaCl.
 - (B) A decrease in the filtrate concentration ability of the kidney.
 - (C) An increase in the amount of interstitial urea to maintain interstitial osmolarity.
 - (D) A and C only.
 - (E) A, B and C.
67. Which of the following is an important distinction between the measurement of basal metabolic rate (BMR) and standard metabolic rate (SMR)?
- (A) An animal must be fasting for the measurement of SMR.
 - (B) BMRs are performed only on ectothermic animals.
 - (C) An organism must be actively exercising for the measurement of BMR.
 - (D) SMRs must be determined at a specific temperature.
 - (E) The BMR for a particular animal is usually lower than that animal's SMR.
68. Taxol is an anticancer drug extracted from the Pacific yew tree. In animal cells, taxol disrupts microtubule formation by binding to microtubules and accelerating their assembly from the protein precursor, tubulin. Surprisingly, this stops mitosis. Specifically, taxol must affect
- (A) the fibers of the mitotic spindle.
 - (B) anaphase.
 - (C) formation of the centrioles.
 - (D) chromatid assembly.
 - (E) the S phase of the cell cycle.
69. During which phase of aerobic respiration is ATP produced directly by substrate-level phosphorylation?
- (A) acetyl CoA formation.
 - (B) ethanol production.
 - (C) glucose formation.
 - (D) the Krebs cycle.
 - (E) all of these are true.
70. Short hair (*L*) is dominant to long hair (*l*). If a short-haired animal of unknown origin is crossed with a long-haired animal and they produce one long-haired and one short-haired offspring, this would indicate that
- (A) the short-haired animal was pure-breeding.
 - (B) the short-haired animal was not pure-breeding.
 - (C) the long-haired animal was not pure-breeding.
 - (D) the long-haired animal was pure-breeding.
 - (E) none of these can be determined with two offspring.
71. Conjugation between a bacterium that lacks an F factor (F^-) and a bacterium that has an F factor on its chromosome (F^+) would typically produce which of the following results?
- (A) The F^- bacterium ends up carrying one or more plasmids from the F^+ bacterium; and the F^+ bacterium that tacks those plasmids.
 - (B) The F^+ bacterium ends up with a recombinant chromosome that carries some genes from the F^- bacterium, and the F^- bacterium ends up with an unaltered chromosome.
 - (C) The F^+ bacterium ends up with a recombinant chromosome that carries some genes from the F^- bacterium, and the F^- bacterium ends up with a chromosome that lacks those genes.
 - (D) The F^- bacterium ends up with a recombinant chromosome that carries some genes from the F^+ bacterium, and the F^+ bacterium ends up with an unaltered chromosome.
 - (E) The F^- bacterium ends up with a recombinant chromosome that carries some genes from the F^+ bacterium, and the F^+ bacterium ends up with a chromosome that lacks those genes.
72. The hypothalamus and pituitary link the activities of the endocrine system and nervous system by
- (A) neurohormones being secreted in response to the summation of neural messages that enter the hypothalamus.
 - (B) shifts in hormonal concentrations being detected by the anterior pituitary.
 - (C) pheromones being secreted as a response to photoperiodic stimuli.
 - (D) the nervous tissue of the anterior lobe of the pituitary sending stimuli to the glandular tissue of the posterior pituitary to produce hormones that will be secreted by the hypothalamus.
 - (E) all of these are true.
73. ZP3 is a mammalian glycoprotein, which is located in the zona pellucida of eggs where it probably serves two functions:
- (A) binds to the heads of sperm and prevents the egg from binding an additional sperm.
 - (B) shuts off the function of DNA polymerase and RNA polymerase.
 - (C) directs both the slow and fast block to polyspermy.
 - (D) stimulates the endosperm and initiates RNA synthesis.
 - (E) stimulates protein synthesis and destroys the arcosome.

74. Suppose you know that the genotype of a male lion captured from a wild population is AaBb. You analyze a very large number of gametes from this individual and find all the gametes are of only two types: AB and ab. Which of the following is the most reasonable conclusion from this information?
- (A) The "A" gene and the "B" gene are probably located close together on the same chromosome.
 - (B) There are multiple alleles present at the "B" locus but not at the "A" locus.
 - (C) The parents of this individual were AABB and AABB.
 - (D) Meiosis is not occurring in this individual.
 - (E) Inbreeding is occurring in this individual.
75. Which of the following does **NOT** contribute to gas exchange in the human fetus?
- (A) Maternal blood and fetal blood flow next to each other in the placenta.
 - (B) Maternal hemoglobin releases oxygen more easily than does fetal hemoglobin.
 - (C) Oxygen is carried through the umbilical cord to the fetus.
 - (D) The placenta keeps the oxygen levels of amniotic fluid very high.
 - (E) Fetal hemoglobin binds oxygen more readily than does maternal hemoglobin.

高雄醫學大學九十六學年度學士後醫學系招生考試試題

科目:有機化學

考試時間: 80 分鐘

說明:一、選擇題用 2B 鉛筆在「答案卡」上作答,修正時應以橡皮擦擦拭,切勿使用修正液(帶),未遵照正確作答方法而致電腦無法判讀者,考生自行負責。
 二、非選擇題限黑色或藍色墨水之鋼筆、原子筆或鉛筆,在「答案卷」上作答。
 三、試題及答案卡必須繳回,不得攜出試場。

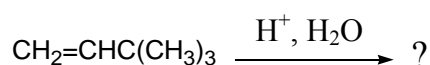
I. Choose one correct answer for the following questions

【單選題】每題 1 分,共計 60 分,答錯一題倒扣 0.25 分,倒扣至本大題零分為止,未作答,不給分亦不扣分。

1. The K_{eq} for the interconversion for the two chair forms of methylcyclohexane at 25 °C is 18. What % of the chair conformations feature an axial methyl group?

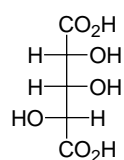
- (A) 95 (B) 75 (C) 50 (D) 25 (E) 5

2. What is the name of the major organic product of the following reaction?



- (A) 3,3-dimethyl-1-butanol (B) 3,3-dimethyl-2-butanol
 (C) 2,3-dimethyl-2-butanol (D) 2,3-dimethyl-1-butanol
 (E) 4-methyl-2-pentanol

3. How many diastereomer(s) exist for the compound below?

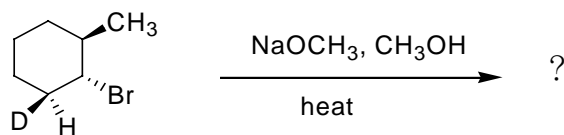


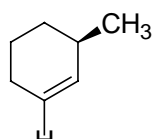
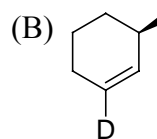
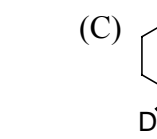
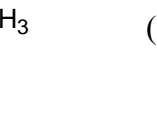
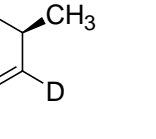
- (A) 2 (B) 4 (C) 6 (D) 8 (E) 0

4. Which of the following statements is (are) true for the Diels-Alder reaction?

- (A) When the diene is electron-rich, the reaction works best when the dienophile contains one or more electron-withdrawing groups conjugated to its C=C.
 (B) Substituents which are *cis* in the dienophile remain *cis* in the product.
 (C) Dienes which cannot achieve an *s-cis* conformation do not react in Diels-Alder reactions.
 (D) Secondary orbital interactions typically cause the *endo* product to be favored kinetically over the *exo*.
 (E) All of the above.

5. What is the major product of the following reaction?

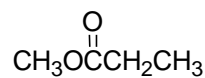
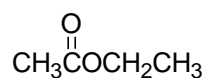


- (A)  (B)  (C)  (D)  (E) 

6. Which sequence of reagents works best to convert 3-hexene to 3-hexyne?

- (A) 1. HCl 2. NaNH₂ (B) 1. BH₃ · THF 2. HO⁻, H₂O₂ 3. NaNH₂
 (C) 1. NaNH₂ 2. HI 3. H₃O⁺ (D) 1. Br₂, CH₂Cl₂ 2. NaNH₂ (excess)
 (E) 1. Cl₂, CH₂Cl₂ 2. NaCN(excess)

7. Which of the following technique(s) can readily distinguish between:



(A) NMR

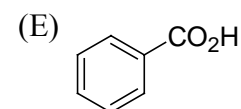
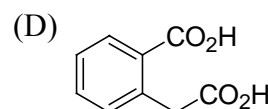
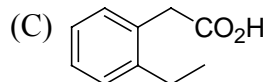
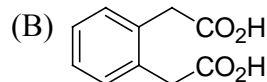
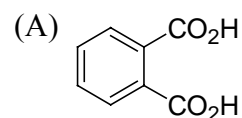
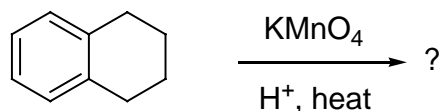
(B) IR

(C) MS

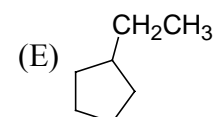
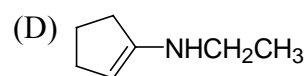
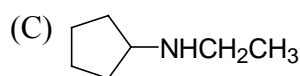
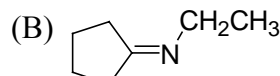
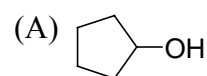
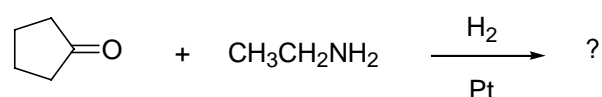
(D) A and B

(E) A and C

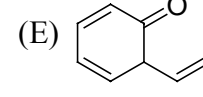
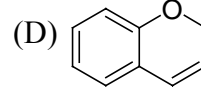
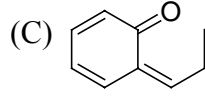
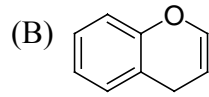
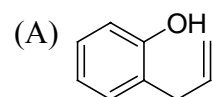
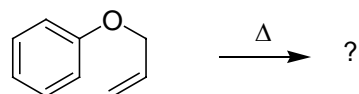
8. What is the major product of the following reaction?



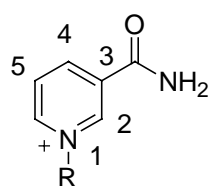
9. What is the major product of the following reaction?



10. What is the major product from the following rearrangement?



11. At what position of the pyridine ring in the coenzyme below will oxidation-reduction reaction take place?



(A) 1

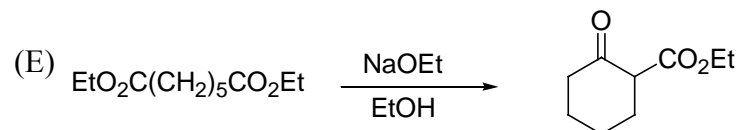
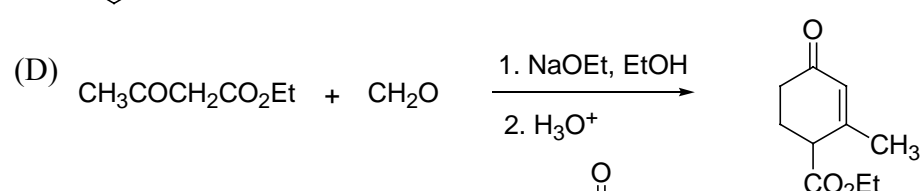
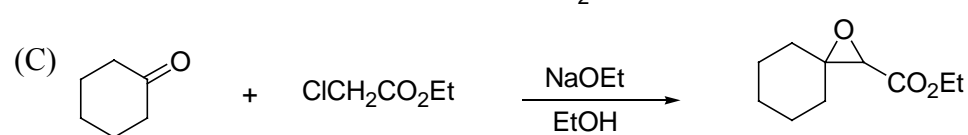
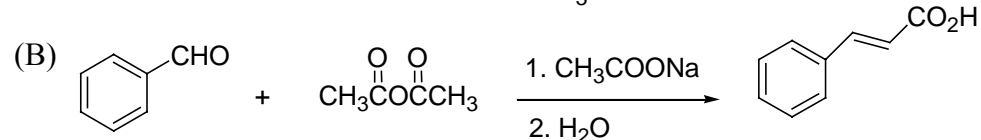
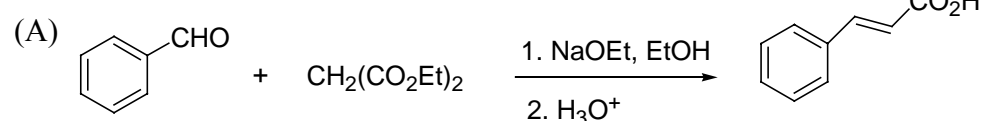
(B) 2

(C) 3

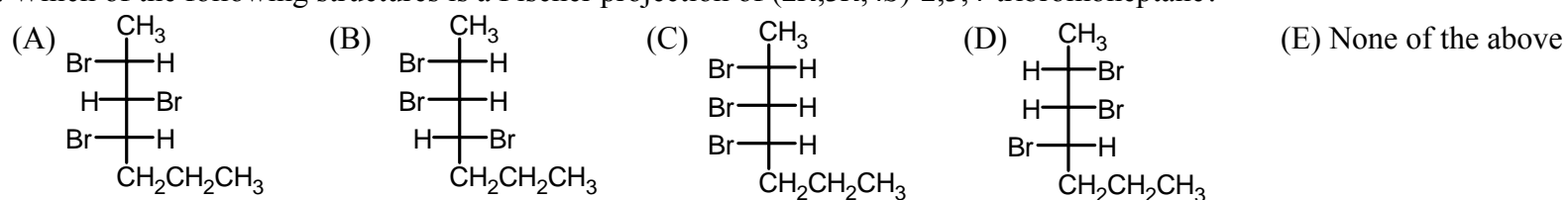
(D) 4

(E) 5

12. Which of the following reaction is called Knoevenagel reaction?



13. Which of the following structures is a Fischer projection of (2*R*,3*R*,4*S*)-2,3,4-tribromoheptane?



14. Arrange the following substrates in order of their increasing S_N2 reactivity with NaCN:

(I) 1-bromopentane, (II) 1-chloro-2,2-dimethylpentane, (III) 2-bromo-2-methylpentane, and (IV) 1-chloro-3,3-dimethylpentane.

(A) IV < II < I < III (B) III < I < IV < II (C) IV < II < III < I (D) III < II < IV < I (E) None of the above

15. Both (*E*)- and (*Z*)-hex-3-ene can be treated with D₂ in the presence of a platinum catalyst. How are the products from these two reactions related to each other?

- (A) The (*E*)- and (*Z*)-isomers generate the same products but in differing amounts.
 (B) The (*E*)- and (*Z*)-isomers generate the same products in exactly the same amounts.
 (C) The products of the two isomers are related as constitutional isomers.
 (D) The products of the two isomers are related as diastereomers.
 (E) The products of the two isomers are related as enantiomers.

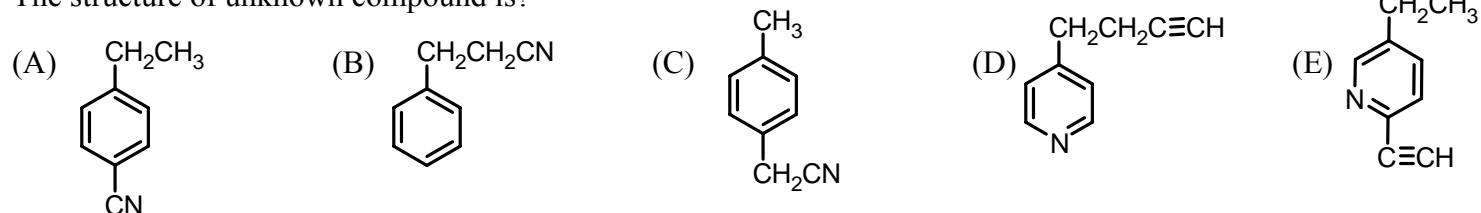
16. Consider the data illustrated below. The formula of unknown compound is C₉H₉N

IR (cm⁻¹): 3050, 2950, 2240, 1630

¹H NMR (δ): 7.5 (2H, d), 7.1 (2H, d), 2.3 (2H, q), 0.9 (3H, t)

¹³C NMR (δ): 137 (s), 130, (s), 126 (d), 122 (d), 95 (s), 25 (t), 15 (q)

The structure of unknown compound is?



17. In electrophilic aromatic substitution reactions, the hydroxyl group is an *o,p*-director because:

- (A) it donates electron density to the ring by induction and destabilizes the *meta* sigma complex.
 (B) it donates electron density to the ring by induction and stabilizes the *ortho* and *para* sigma complexes.
 (C) it donates electron density to the ring by resonance and destabilizes the *meta* sigma complex.
 (D) it donates electron density to the ring by resonance and stabilizes the *ortho* and *para* sigma complexes.
 (E) None of the above.

18. (*S*)-2-Methylbutanal _____ upon sitting in an acidic or a basic aqueous solution.

- (A) racemizes (B) esterifies (C) inverts completely to the *R* configuration
 (D) hydrolyzes (E) irreversibly forms the hydrate

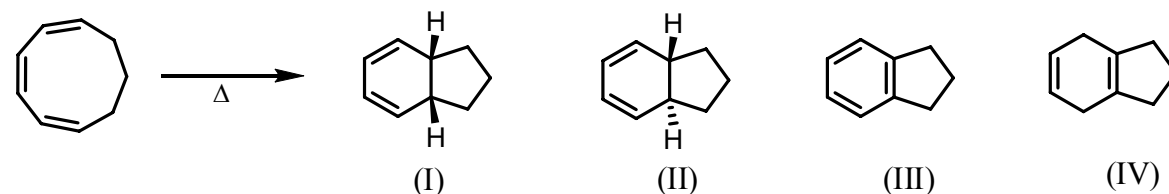
19. When a carbonyl is part of a conjugated π-network, the C=O stretch:

- (A) has a higher frequency than in a nonconjugated system.
 (B) has a lower frequency than in a nonconjugated system.
 (C) always occurs at 1710 cm⁻¹.
 (D) occurs around 2700 cm⁻¹.
 (E) cannot be distinguished from the C=O stretch in a nonconjugated system.

20. When pent-1-ene is treated with mercury(II) acetate in methanol and the resulting product is reacted with NaBH₄, what is the primary organic compound which results?

(A) 3-ethoxypentane (B) 1-methoxypentane (C) 1-ethoxypentane (D) 2-ethoxypentane (E) 2-methoxypentane

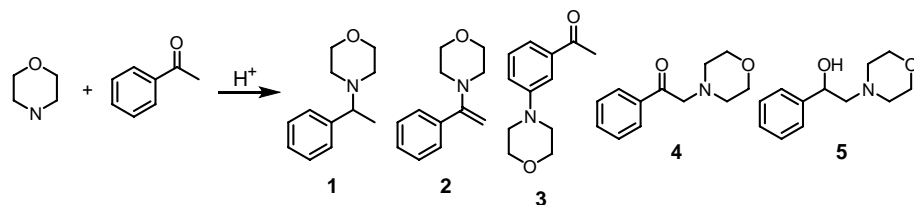
21. What is the major product of the following reaction?



(A) I (B) II (C) III (D) IV (E) None of the above.

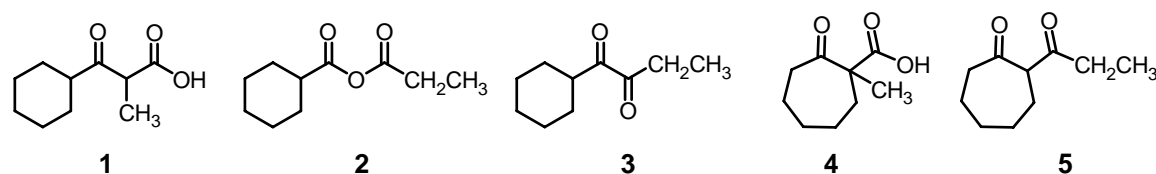
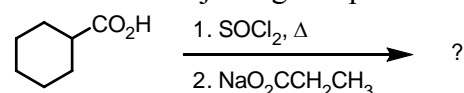
22. Which of the following terms describes the mechanism of a Claisen rearrangement reaction?
 (A) Electrophilic addition (B) Nucleophilic addition (C) *syn* Elimination
 (D) Radical substitution (E) Pericyclic reaction

23. What is the major organic product obtained from the following reaction?



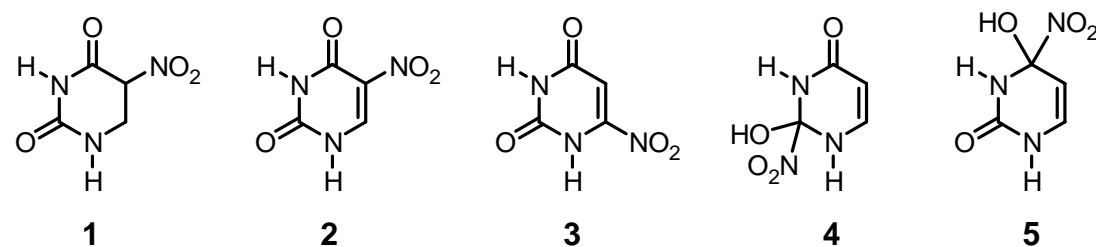
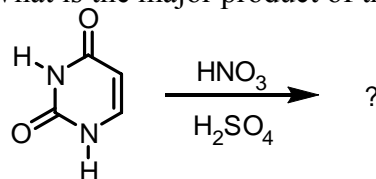
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

24. What is the major organic product obtained from the following sequence of reactions?



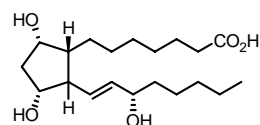
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

25. What is the major product of the following reaction?



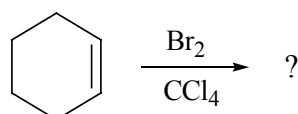
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

26. Which of the following terms best describes the compound shown below?



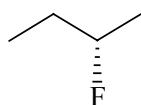
- (A) a lecithin (B) a diterpene (C) a steroid (D) a glyceride (E) a prostaglandin

27. What configurations are found in the product(s) of the reaction shown below?



- (A) 1*R*, 2*R* only (B) 1*S*, 2*S* only (C) 1*R*, 2*S* only (D) An equal mixture of 1*R*, 2*R* and 1*S*, 2*S*
 (E) An equal mixture of 1*R*, 2*R* and 1*R*, 2*S*

28. Which of the following statements correctly describes the molecule shown below? .



- (A) It is achiral
 (B) It is *meso*
 (C) Its asymmetric center possesses the *R* configuration
 (D) The mirror image of this molecular is its enantiomer
 (E) The molecule possesses enantiotopic hydrogens

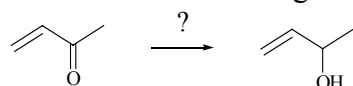
29. Which of the following m/z values is the base peak for benzyl alcohol?
(A) 17 (B) 52 (C) 77 (D) 91 (E) 108

30. What splitting pattern is observed in the proton NMR spectrum for the indicated hydrogens?
 $\text{CH}_3\text{OCH}_2\text{CH}_2\text{OCH}_3$
↑
(A) Singlet (B) Doublet (C) Triplet (D) Singlet of singlet (E) Multiplet

31. The Hell-Volhard-Zelinsky reaction involves:
(A) α -Bromination of carboxylic acids (B) α -Bromination of ketones
(C) Formation of α, β -unsaturated carboxylic acids (D) Formation of β -ketoesters
(E) Formation of amines

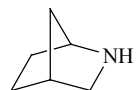
32. Which of the following reagents would reduce carboxylic acids and esters into alcohols?
(A) $\text{H}_2/\text{Raney Ni}$ (B) 1) LiAlH_4 ; 2) H_3O^+
(C) 1) NaBH_4 ; 2) H_3O^+ (D) Na/NH_3 (E) $\text{Zn}(\text{Hg})/\text{H}^+$

33. Which of the following reducing agents is best used in the reaction shown below?



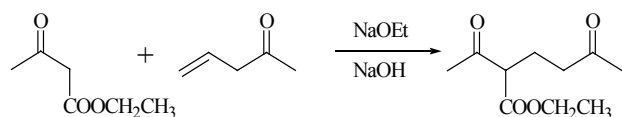
(A) $\text{H}_2/\text{Raney Ni}$ (B) 1) LiAlH_4 ; 2) H_3O^+
(C) 1) NaBH_4 ; 2) H_3O^+ (D) Na/NH_3 (E) $\text{Zn}(\text{Hg})/\text{H}^+$

34. What is the systemic name of the following compound?



(A) 1-Azabicyclo[2,2,1]heptane (B) 2-Azabicyclo[2,2,1]heptane
(C) 1-Azabicyclo[2,2,1]hexane (D) 2-Azabicyclo[2,2,1]hexane
(E) 1-Azabicyclo[2,1,1]hexane

35. What is the name of the following reaction?



(A) Wittig reaction (B) Michael reaction (C) Dieckmann condensation
(D) Cope reaction (E) Knoevenagel reaction

36. Which of the following lists the correct order of reactivity of the substrates in electrophilic aromatic substitution reactions?

(A) Thiophene > pyrrole > furan > benzene (B) Benzene > thiophene > furan > pyrrole
(C) Furan > pyrrole > benzene > thiophene (D) Pyrrole > furan > thiophene > benzene
(E) Benzene > furan > pyrrole > thiophene

37. In the addition of HBr to alkynes in the absence of peroxides, which of the following species is believed to be an intermediate?

(A) Vinyl anion (B) Vinyl cation (C) Vinyl radical (D) Carbene (E) Bromonium ion

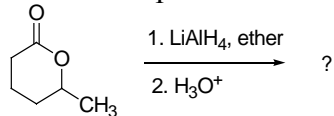
38. Which of the following statements about propene is correct?

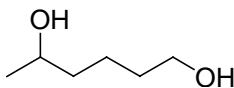
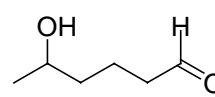
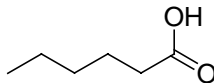
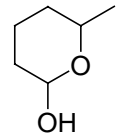
(A) All of the hydrogen atoms are in the same plane
(B) The compound has a *cis* and *trans* isomer
(C) It generally acts as a Lewis acid
(D) There is a total of eight sigma bonds
(E) All the carbon atoms are sp^2 hybridized

39. The *t*-butoxycarbonyl group (Boc) is a widely used protecting group for primary amine and secondary amine. What reagent is commonly used for deprotection of *N*-Boc group in the Merrifield solid phase peptide synthesis?

(A) OH^- (B) $\text{Pd}/\text{C}, \text{H}_2$ (C) $\text{Pd}(\text{OH})_2/\text{C}, \text{H}_2$ (D) Acetic acid (E) CF_3COOH

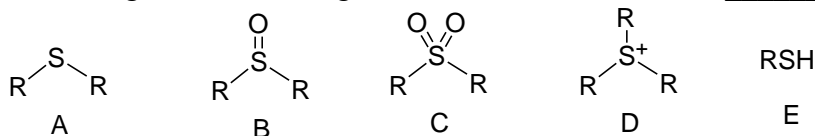
40. Predict the product of the following reaction:



(A)  (B)  (C)  (D)  (E) None of the above

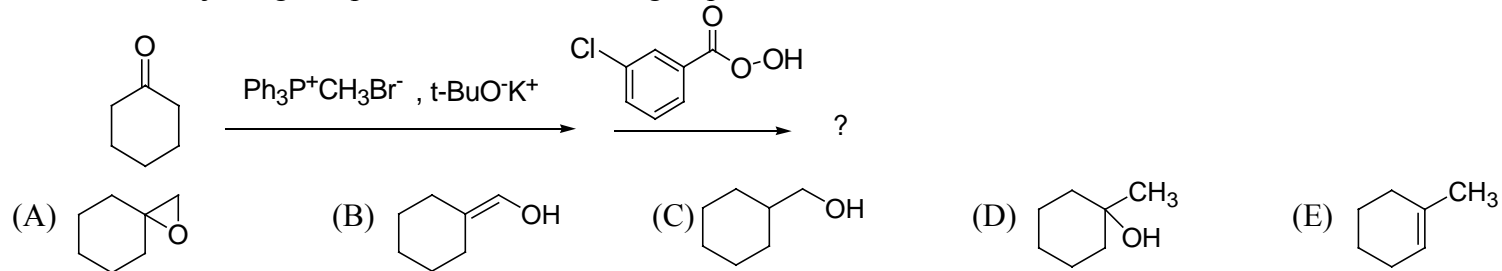
41. The best method for preparation nonhalogenated cyclopropanes is by a process called the _____ reaction.
 (A) Claisen rearrangement (B) Schmidt (C) Curtius
 (D) Pauson-Khand (E) Simmon-Smith

42. In the following structures, the general structure of sulfone is _____.

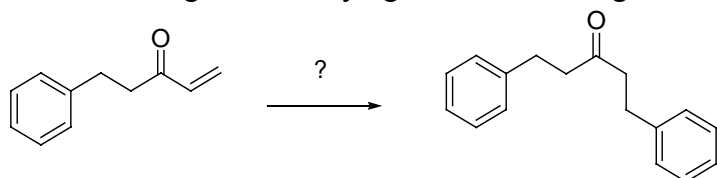


(A) A (B) B (C) C (D) D (E) E

43. What is the major organic product of the following sequence of reactions?

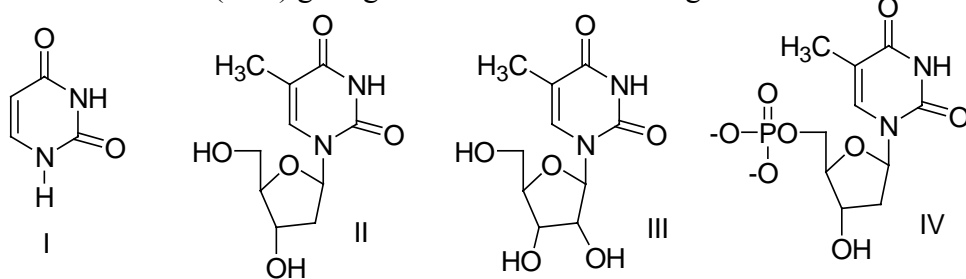


44. Choose the best reagent for carrying out the following conversion.



(A) 1. PhMgBr, ether; 2. H₃O⁺ (B) 1. PhCH₂MgBr, ether; 2. H₃O⁺
 (C) (C₆H₅)₃P=CHC₆H₅, THF (D) Li(C₆H₅)₂Cu, ether (E) None of the above

45. From the structures (I-IV) giving below which one belongs to nucleotide.



(A) I (B) II (C) III (D) IV (E) None of the above

46. What fragment ion (*m/z*) is produced from McLafferty rearrangement of 5-methyl-2-hexanone in EI-MS?

(A) 114 (B) 43 (C) 58 (D) 108 (E) None of the above

47. Select the most reasonable formula for the compounds with the following mass spectral data: M⁺ at *m/z* = 136 and M⁺ at *m/z* = 138 of approximately equal intensity.

(A) C₆H₁₃OCl (B) C₄H₉Br (C) C₁₀H₁₆ (D) C₉H₁₂O (E) None of the above

48. If a compound has the -OH, -OCH₃, and -CHO groups all attached to a single benzene ring, the IUPAC name of the compound is based on which of the following?

(A) Anisole (B) Benzaldehyde (C) Phenol (D) Methylene ether (E) Phenyl

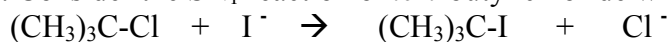
49. Which one of the following would **NOT** be a suitable solvent for Grignard reagents?

(A) Diethyl ether (B) Tetrahydrofuran (THF) (C) Ethanol (D) Hexane
 (E) They would all be suitable solvents

50. (*S*) (+)-Butanol shows a specific rotation at +13.52°. What is the ratio of (*S*) (+)-butanol and (*R*) (-)-butanol when the measured rotation equals to +6.76°?

(A) (*S*) : (*R*) = 4 : 1 (B) (*S*) : (*R*) = 2 : 1 (C) (*S*) : (*R*) = 1 : 2 (D) (*S*) : (*R*) = 1 : 2.5 (E) (*S*) : (*R*) = 3 : 1

51. Consider the S_N1 reaction of *tert*-butyl chloride with iodide ion:



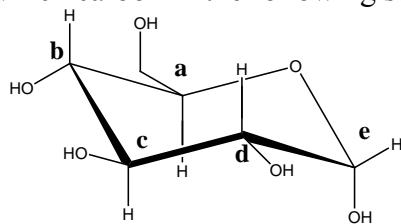
If the concentration of iodide ion is doubled, the rate of forming *tert*-butyl iodide will:

(A) Double (B) Increase 4 times (C) Remain the same (D) Decrease (E) Triple

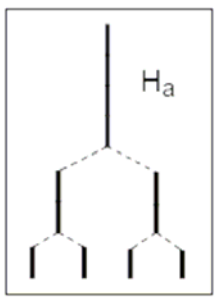
52. Which of the following functional groups would **NOT** show an IR absorbance above 3000 cm⁻¹?

(A) An amine (NH₂) (B) A carbonyl (C=O) (C) An alcohol (OH) (D) A vinylic carbon-hydrogen bond (=C-H)
 (E) A methylene hydrogen (-CH₂-)

53. Which part of the electromagnetic spectrum interacts with the nuclear spins of protons ?
 (A) Radio Waves (B) X-Ray radiation (C) Visible Light (D) Infrared radiation (E) Ultra violet light
54. The pinacol rearrangement proceeds via _____ intermediate.
 (A) carbanion (B) carbocation (C) radical (D) carbene (E) neutral
55. Which carbon in the following sugar is the *anomeric* carbon atom?

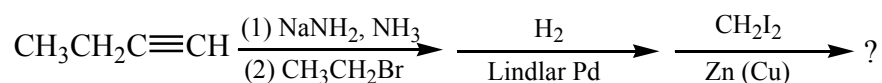


- (A) a (B) b (C) c (D) d (E) e
56. A tree diagram for the splitting of a proton H_a is reproduced below. What is the origin of this splitting pattern?



- (A) H_a is coupled to two nonequivalent hydrogens with identical coupling constants.
 (B) H_a is coupled to two nonequivalent hydrogens with different coupling constants.
 (C) H_a is coupled to three nonequivalent hydrogens with identical coupling constants.
 (D) H_a is coupled to three nonequivalent hydrogens with different coupling constants.
 (E) H_a is coupled to three equivalent hydrogens with identical coupling constants.
57. Which of the following combinations of reactants would produce a *meso* compound?
 (A) *Cis*-3-hexene and Br_2 (B) *Trans*-3-hexene and Br_2
 (C) *Cis*-3-hexene and Br_2 in H_2O (D) *Trans*-3-hexene and Br_2 in H_2O
 (E) *Trans*-3-hexene and $H_2/Pd/C$

58. What is the product of the following sequence of reactions?



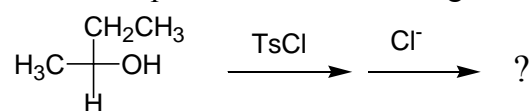
- (A) 1,1-Diethylcyclopropane (B) *Cis*-1,2-diethylcyclopropane
 (C) *Trans*-1,2-diethylcyclopropane (D) *Cis* and *trans*-1,1-diiodo-2,3-diethylcyclopropane
 (E) *Cis*-1,2-diethyl-3,3-diiodocyclopropane
59. An unknown hydrocarbon shows a parent peak on the mass spectra at $m/z = 86$. There is no evidence of absorption from visible or UV spectra. The IR shows no major absorption outside the C-H stretch and bending vibration. The 1H NMR reveals a singlet at δ 0.9 (9H), a triplet at 0.98 (3H) and a quartet at 1.6 (2H). Which compound below best fits the description?
- (A) $CH_3CH_2C(CH_3)CH_2CH_3$ (B) $CH_3C(CH_3)CH_2CH_3$ (C) $CH_3CH(CH_3)CH_2CH_3$ (D) $CH_3CH_2CH_2CH_2CH_2CH_3$
 (E) $CH_3CH(CH_3)CH_2CH_2CH_3$

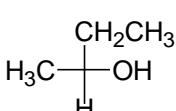
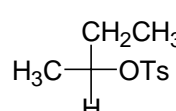
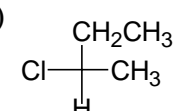
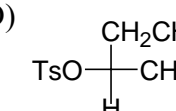
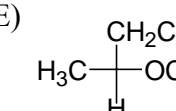
60. Which statement is correct for the reaction shown below?
 $1\text{-chloro-2,4-dinitrobenzene} + NaOH \rightarrow 2,4\text{-dinitrophenol}$
 (A) This reaction is an electrophilic aromatic substitution.
 (B) This reaction is a S_N1 substitution.
 (C) This reaction is a nucleophilic aromatic substitution.
 (D) Substituted benzyne is the reaction intermediate.
 (E) None of the above.

II. Choose one correct answer for the following questions

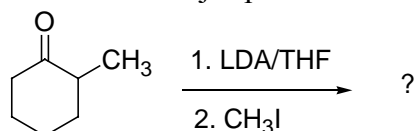
【單選題】每題 2 分，共計 40 分，答錯一題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

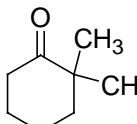
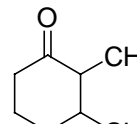
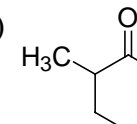
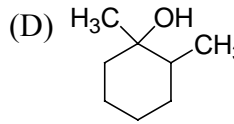
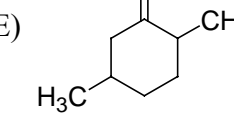
61. What is the product of the following reaction?



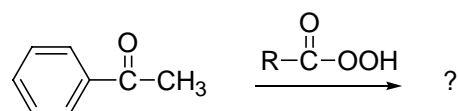
- (A)  (B)  (C)  (D)  (E) 

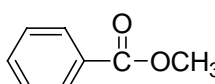
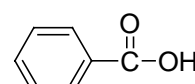
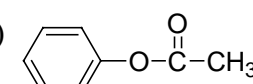
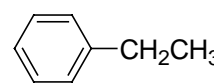
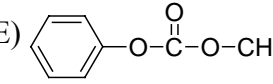
62. What is the major product of the following reaction?



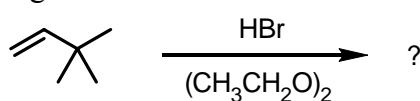
- (A)  (B)  (C)  (D)  (E) 

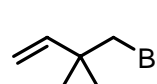
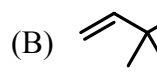
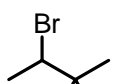
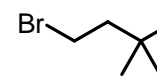
63. What is the major product of the following reaction?



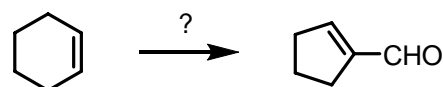
- (A)  (B)  (C)  (D)  (E) 

64. Which of the following compounds is the major organic product generated in the reaction below? Pay particular attention to region- and stereochemical detail.



- (A)  (B)  (C)  (D)  (E) None of the above.

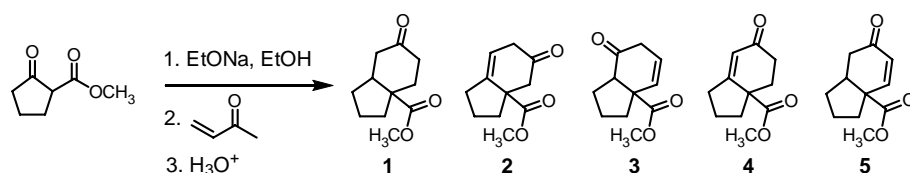
65. Which of the following series of synthetic steps could be used to carry out the transformation shown below?



(I) NaOH, (II) HCl, (III) PCC, (IV) O₃, (V) S(CH₃)₂, (VI) H₂O₂, NaOH

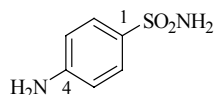
- (A) II → IV → V (B) III → V → I (C) IV → VI → III (D) IV → V → I (E) None of the above.

66. What is the major organic product obtained from the following reaction?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

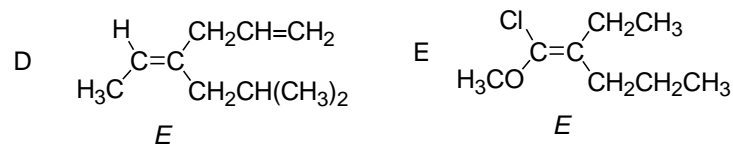
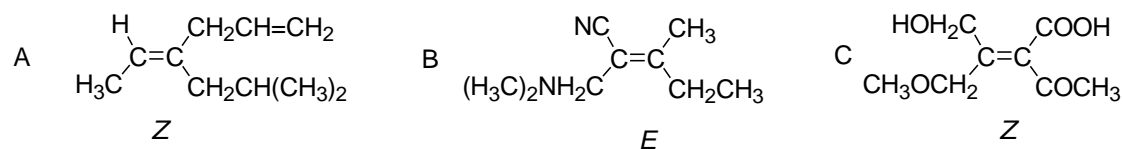
67. Which of the following statements correctly describes the molecule shown below?



- (A) Its C-4 NH₂ is strongly basic while the C-1 NH₂ is weakly acidic.
 (B) Its C-4 NH₂ is weakly basic while the C-1 NH₂ is strongly acidic.
 (C) Its C-4 NH₂ is weakly basic while the C-1 NH₂ is weakly acidic.
 (D) Its C-4 NH₂ is strongly basic while the C-1 NH₂ is strongly acidic.
 (E) Both C-1 NH₂ and the C-4 NH₂ are weakly basic.

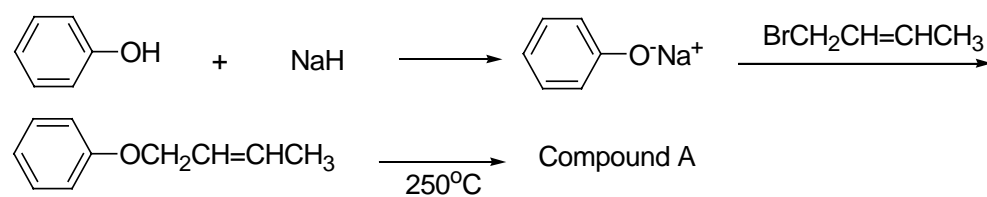
68. Which of the compounds below undergoes solvolysis in aqueous ethanol most rapidly?
 (A) Cyclohexyl bromide (B) Isopropyl chloride (C) Methyl iodide
 (D) 3-Chloropentane (E) 3-Iodo-3-methyl pentane

69. Which of the following *E*, *Z* designation are incorrect?

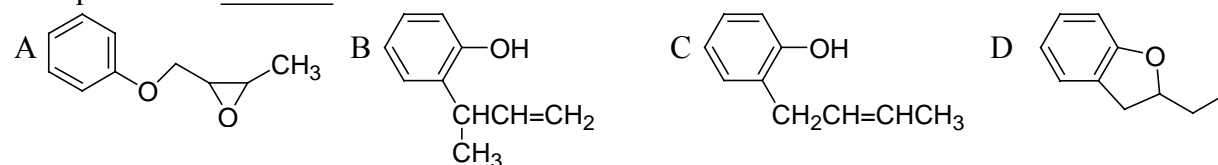


- (A) AB (B) BC (C) CD (D) AD (E) AC

70. Provide structure for compound A in the following reaction scheme:

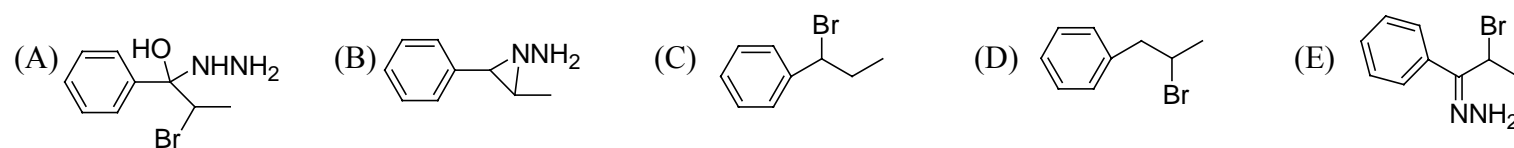
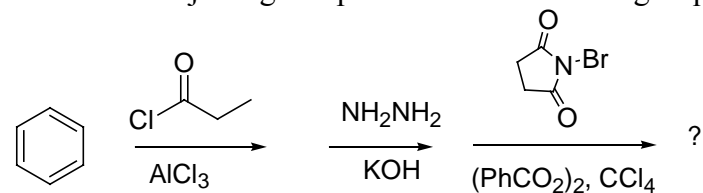


Compound A is _____.



- (A) A (B) B (C) C (D) D (E) None of the above

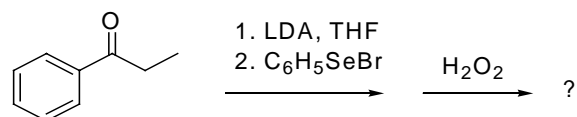
71. What is the major organic product of the following sequence of reactions?



72. What product would you obtain from Claisen condensation of ethyl propanoate?

- (A) Ethyl 2-ethyl-3-oxopentanoate (B) Propyl 2-methyl-3-oxopentanoate
 (C) Ethyl 2-methyl-3-oxohexanoate (D) Propyl 2-methyl-3-oxohexanoate
 (E) Ethyl 2-methyl-3-oxopentanoate

73. What is the major organic product of the reaction shown below?



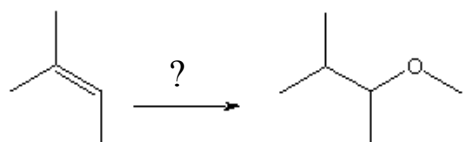
- (A) Ethyl benzoate (B) Phenyl propionate (C) Diphenyl ketone (D) Phenyl vinyl ketone
 (E) An phenylseleno ketone

74. Which of the following reactions has a mechanism that involves the formation of a cyclic intermediate from acyclic starting materials?

- (A) Dehydration of an alcohol (B) Addition of HBr to an alkene
 (C) Chlorination of an alkane (D) Addition of bromine to an alkene
 (E) Addition of Grignard to ketone

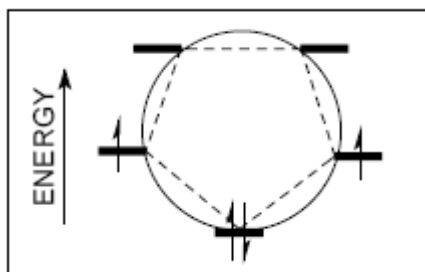
75. Which of the following substituents would have the lowest Cahn-Ingold-Prelog priority?
 (A) $-\text{CH}_2\text{OH}$ (B) $-\text{CH}_2\text{COOH}$ (C) $-\text{CH}_2\text{CH}_2\text{Cl}$ (D) $-\text{CH}_2\text{NH}_2$ (E) $-\text{CH}_2\text{CH}_2\text{Br}$

76. Which sets of reagents would give the correct product for this reaction?



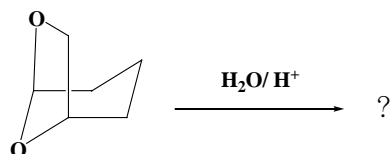
- (A) $\text{Hg}(\text{OCOCF}_3)_2$ in MeOH (B) 1. $\text{Hg}(\text{OAc})_2$ in THF/ H_2O_2 , 2. NaBH_4
 (C) 1. BH_3 , 2. NaOH , H_2O_2 (D) 1. BH_3 , 2. H_2O_2 , OH^- , 3. NaH , 4. CH_3I
 (E) H^+ , CH_3OH

77. The Frost circle can be used to reproduce the molecular orbital energies of a cyclic polyene. What species would be described by the Frost circle to the right?



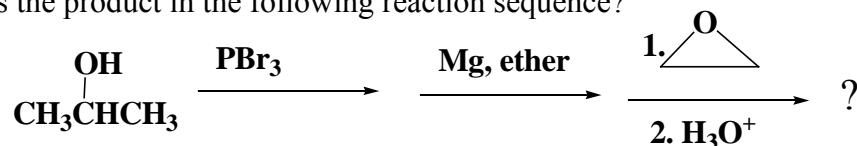
- (A) Cyclopentadienyl cation (B) Cyclopentadienyl radical
 (C) Cyclopentadienyl anion (D) Cyclopentadiene
 (E) Cyclopentene anion

78. What is the product of acid-catalyzed hydrolysis of the ketal shown below?



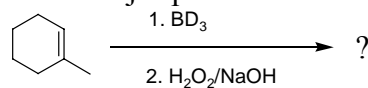
- (A) (B) (C) (D) (E)

79. What is the product in the following reaction sequence?



- (A) (B) (C) (D) (E) None of the above

80. What is the major product for the following reaction?



- (A) (B) (C) (D) (E)

英文

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14
答案	A	C	C	A	B	A	A	C	D	E	E	C	B	E
題號	15	16	17	18	19	20	21	22	23	24	25	26	27	28
答案	A	E	D	C	E	C	C	E	B	D	A	A	E	B
題號	29	30	31	32	33	34	35	36	37	38	39	40	41	42
答案	B	D	E	D	B	A	A	B	C	C	E	B	D	A
題號	43	44	45	46	47	48	49	50	51	52	53	54	55	56
答案	B	B	A	B	B	D	B	C	E	D	B	E	C	A
題號	57	58	59	60										
答案	C	D	D	B										

有機化學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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題號	29	30	31	32	33	34	35	36	37	38	39	40	41	42
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題號	71	72	73	74	75	76	77	78	79	80				
答案	C	E	D	D	B	D	A	B	C	C				

普通生物學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14
答案	B	D	E	A	E	E	D	C	C	C	D	D	A	C
題號	15	16	17	18	19	20	21	22	23	24	25	26	27	28
答案	A	A	B	D	C	D	D	C	A	C	D	A	B	A

