Part I. Question 1 to 10, please choose the answer closest to the underlined word or phrase. Question 11 to 15, please choose the answer that best completes the sentence. One Answer Only. 2 points.

1. Some of the **potential** dangers to cows treated with synthetic bovine growth hormone were brought into light through the effort of some scientist.
(A) related (B) possible (C) certain (D) obvious
2. As more U.S workers spend their days at keyboards, hand injuries and lawsuits are **multiplying**.
(A) increasing (B) minimizing (C) boundary-crossing (D) profit-making
3. There are several **bodies** that match volunteers with voluntary groups, including the National Volunteering Centre.
(A) organizations (B) remains (C) people (D) motivations
4. Piaget believed that we go through four stages in understanding the world. Each of the stages is age-related and consists of **distinct** ways of thinking.
(A) new (B) simple (C) different (D) exact
5. Some people think that spoken language is **transient** but writing tends to last because of its physical medium (characters on some surface).
(A) unimportant (B) temporary (C) interesting (D) clear
6. But what most prevents women from reaching the boardroom, say bosses and headhunters, is lack of **hands-on** experience of a firm's core business.
(A) significant (B) available (C) tested (D) practical
7. Manufactured in the **tranquil** New England town of Concord, New Hampshire, the famous Concord Coach came to symbolize the Wild West.
(A) peaceful (B) bustling (C) industrial (D) tiny
8. With oil prices shooting up, the demand for big cars is **dwindling**. Now compact cars are on great demand.
(A) depressing (B) surpassing (C) decreasing (D) swirling
9. All of this she conferred on me without ever **setting foot in** the kitchen of her house.
(A) leaving (B) dressing (C) entering (D) preparing
10. In choosing your career, you should follow your heart, but you also need to be **rational**.
(A) making decisions based on intelligent thinking (B) making decisions using strong emotion of feeling
(C) making decisions because of relationships (D) making decision because of profits
11. _____ abolishing death penalty is a global trend, the public is so polarized over the issue that it requires more discussion.
(A) Because (B) Whereas (C) Although (D) In addition to
12. Women now often work areas _____ medicine, business management and higher education, which would not have been possible 100 years ago.
(A) regardless of (B) in virtue of (C) due to (D) such as
13. Both the National Cancer Institute and the World Health Organization say there isn't evidence to support the assertion that cell phones are a _____ threat.
(A) health public (B) healthy public (C) public-health (D) publically health
14. _____ on barren slopes can help prevent erosion.
(A) Planting trees (B) For trees to be planted (C) In order to plant trees (D) Trees are planted
15. Almost four in five people around the world believe that _____, a poll for the BBC World Service suggests.
(A) access the Internet is a fundamental right (B) that access to the Internet is a fundamental right
(C) fundamental right accessing the Internet is (D) the fundamental right is access the Internet

II. Question 16 to 25, please choose the best answer to fill each of the numbered blanks in the passages. 2 points each.

People communicate in many different ways and yawning is one important means of **16** communication. It gives many different **17** to people and everyone yawns. Some birds, reptiles, fish and most mammals also yawn. However, the reason why we do it is still a mystery. There is also very little research available on yawning as for most people, it is not a problematic **18**. Here are a few things that are know about yawns: 1). The **19** duration of a yawn is about six seconds; 2.) in humans, the **20** yawn happens about eleven weeks after conception; 3.) Yawns become contagious to people between the first and second years of life.

16. (A) audio (B) friendly (C) non-verbal (D) scenario
17. (A) messages (B) funs (C) challenges (D) experiments
18. (A) resistance (B) repeat (C) reflex (D) rejection
19. (A) critical (B) analytical (C) terminal (D) average
20. (A) most difficult (B) earliest (C) most fundamental (D) experiential

Culture shock can be an excellent lesson **21** human differences. The reason culture shock occurs is that we are not prepared for these differences. **22** the way we are taught in our culture, we are all ethnocentric. This term comes from the Greek root ethnos, **23** a people or group. Thus, it refers to **24** our outlook or world view is centered on our own way of life. Ethnocentrism is the belief that one's own patterns of behavior are the best: the most natural, beautiful, right, or important. Therefore, other people, **25** that they live differently, live by standards that are inhuman, irrational, unnatural, or wrong.

21. (A) on relative values and understanding (B) in relative values and in understanding
(C) about relating values and on understanding (D) by means of relative values and understanding
22. (A) Because of (B) Because (C) In the event of (D) In spite of
23. (A) it means (B) it is meaning (C) meaning (D) by meaning
24. (A) that the fact (B) the fact that (C) the fact (D) the fact that is
25. (A) to the extend (B) by and large (C) more or less (D) drawing a line

III. Reading Comprehension. In this part, you will read several passages. Each one is followed by a number of questions. Question 26 to 40, you should choose the ONE best answer to each question. 2 points each.

Dariusz Leszczynski, a research professor at Finland's Radiation and Nuclear Safety Authority in Helsinki, has done studies indicating that radio frequency radiation may create a stress reaction in the cells that line blood vessels, leading to a dangerous breach in the blood-brain barrier. "Mobile-phone radiation may be able to indirectly hurt cells, perhaps by interfering with their ability to repair normal DNA damage," he says. "Given the scientific uncertainty, it's premature to say the use of cell phones is safe."

If radio frequency radiation increases the chances of developing brain cancer, it should show up in long-term studies of cell-phone users. But many epidemiological studies have found no clear connection, including a 2007 Danish Cancer Society study of 421,000 cell-phone users, which led many in the media to conclude that mobiles are harmless. To date, "peer-reviewed scientific evidence has overwhelmingly indicated that wireless

devices do not pose a risk," says John Walls, a spokesman for CTIA, a global wireless association.

26. According to Prof. Dariusz Leszczynski,
(A) whether or not the use of cell phones is safe is still uncertain.
(B) it is proved that cell phone would impair normal DNA.
(C) Using cell phones will block blood vessels.
(D) The research on cell phones is not reliable.
27. The passage following these two passages might be about
(A) the autobiography of Dariusz Leszczynski.　(B) problems with many of these studies.
(C) the development of brain cancer.　(D) peer review of cell phones.

While fats have lately acquired a bad image, one should not forget how essential they are. Fats provide the body's best means of storing energy, a far more efficient energy sources than either carbohydrates or proteins. They act as insulation against cold, as cushioning for the internal organs, and as lubricants. Without fats, energy would have no way to utilize fat-soluble vitamins. Furthermore, some fats contain fatty acids that contain necessary growth factors and help with the digestion of other food.

An important consideration of fat intake is the ratio of saturated fats to unsaturated fats. Saturated fats, which are derived from dairy products, animal fats, and tropical oils, increase amount of cholesterol in the blood. Cholesterol may lead to coronary heart disease by building up in the arteries of the heart. However, unsaturated fats, derived from vegetable oils, tend to lower serum cholesterol if taken in a proportion twice that of saturated fats.

The consumption of a variety of fats is necessary, but the intake of too much fat may lead to a variety of health problems. Excessive intake of fats, like all nutritional excesses, is to be avoided.

28. Comparing with carbohydrates or proteins, fats
(A) store food more efficiently.　(B) deserve their bad image.
(C) consume more oils.　(D) provide more fluids.
Which of the followings is the main idea of
29. The main idea of the third paragraph is that
(A) people are eating less and less fat today.　(B) fats should be eliminated.
(C) excessive consumption of fats may be dangerous to one's health.
(D) fats taken in the proper proportion may reduce serum cholesterol.
30. With which of the following is the whole passage primarily concerned?
(A) The role of fats in human health　(B) The dangers of cholesterol
(C) The benefits of fats in the diet　(D) The importance of good nutrition

Gender Equity

(1)　In the past decade, increasing attention has been paid to the issue of gender equity in the science, technology, engineering, and mathematics (STEM) fields. Research publications, including the American Association of University Women Educational Foundation's Tech Savvy (2000) and Women at Work (2003), have documented the troubling shortage of girls and women preparing to work in these fields. In response to this "**shrinking pipeline**" of girls and women in STEM, a wide array of programs and strategies has been promoted and funded by governmental and nongovernmental organizations.

(2)　The AAUW Educational Foundation and the National Science Foundation are among the top supporters of gender equity projects in the STEM fields. In the last decade alone, these two foundations have

invested nearly $90 million to fund more than 400 projects specifically aimed at increasing the participation of girls and women in STEM fields. This body of projects presented a unique opportunity to explore the nature of gender equity intervention projects in STEM. Until now, no comparable survey of gender equity intervention projects in STEM has been done.

(3) The research for this report, led by Yasmin Kafai and a team of researchers at the University of California, Los Angeles, was guided by several overarching questions: What types of projects have been funded within and across the various STEM disciplines? Are there areas where we have concentrated our efforts, and areas we have overlooked? What patterns emerge among the project types and disciplines?

(4) The findings document impressive efforts in preparing girls and women for science, technology, engineering, and mathematics studies and careers and demonstrate a rich and diverse body of gender equity intervention projects within all STEM disciplines. About two-thirds of the projects involved extracurricular informal learning activities such as museum visits and field trips. Equally important were mentoring activities in many forms, ranging from traditional one-to-one to large-scale online versions, and professional development activities, such as course taking and network building, that were successfully integrated into projects.

(5) At the same time, the findings reveal some troubling trends. Many projects focused predominantly on career advice without providing access to necessary skill and content development. A majority of projects occurred outside the school curriculum. While such extracurricular1 projects can be effective and valuable, the overall lack of integration into the school curriculum suggests that gender equity remains on the margins of teaching and learning in the STEM fields. Finally, an absence of data on participant demographics and a lack of project evaluation make it difficult to determine who is being served and if and how project outcomes are being measured.

31. What does the phrase "shrinking pipeline" in paragraph refer to?
(A) the shortage of oil supply　　(B) the shortage of labor supply
(C) the shortage of training programs　　(D) an issue that is getting smaller

32. Which of the sentences below best express the essential information in the highlighted sentence in the passage 2? (Incorrect choices change the meaning in important ways or leave out essential information.)
(A) These projects allowed us to study the differences between men and women employed in STEM jobs.
(B) We were able to intervene when women STEM workers were being treated unfairly.
(C) Studying these projects helped to create more gender equity intervention projects.
(D) STEM jobs were able to be studied by exploring nature.

33. In paragraph 3, "Are there areas where we have concentrated our efforts, and areas we have overlooked?" In this sentence, "we" refers to
(A) the author and his/her coworkers.　　(B) people involved in creating gender equity projects.
(C) people in the STEM disciplines.　　(D) Yasmin Kafai and his team.

34. According to paragraph 4, what is one positive finding of this research?
(A) the STEM field is rich and diverse　　(B) many projects involved mentoring opportunities
(C) girls and women are being prepared for STEM jobs　　(D) the quality of the questions asked

35. According to paragraph 5, what is one negative trend discovered through this research?
(A) access to unnecessary content　　(B) extracurricular projects were common
(C) evaluation of the projects was too specific　　(D) focus on career advice

Chili peppers are decidedly an international phenomenon, spicing up regional dishes from Thailand to North Africa. In Thailand Confidential, this week’s Globalist Bookshelf selection, Jerry Hopkins gives insight

to the culture and history surrounding this fiery fruit (yes, technically a fruit) and highlights how it may be one of the world's best medical miracles.

In Thailand—where restaurants rate their dishes by placing one, two, three, and sometimes four little red chilis on the menu next to the dishes' names to alert diners—I am tolerated. Barely.

A longtime friend, who is a Thai chef, used to bring home food purchased at street stalls and as she placed this on the table, she would point to one container and say, "Mine," then to another, saying, "Yours." As if to say, "Poor dear."

Thailand is not the birthplace of the Capsicum, or chili pepper; it only acts as if it is. In fact, the chili was imported, along with much else in the national diet. However, in Thailand the **per capital consumption** of the small, fiery fruit is surely as high if not higher than it is anywhere else. And it is in the use of unprocessed, fresh, ripe chilis where Thailand rings all the loudest bells.

The truth is that chili is an international phenomenon. There is a bimonthly magazine published in the United States, Chili Pepper (there is no agreement on the spelling), and a wide variety of products is available, including pepper-shaped wind chimes, bells, and strings of Christmas tree lights. There is even a Hot Sauce Club of America; members receive two new hot sauces and a newsletter every month. There is even a popular American rock and roll band that calls itself the Red Hot Chili Peppers. Yes, the band is hot.

36. From these passages, we learn that the author
(A) enjoys chili peppers everywhere.
(B) does not really like chili peppers.
(C) likes to have chili peppers to go with some certain kind of food.
(D) like to go to restaurant famous for chili peppers.
37. The best title for these passages is
(A) Thailand and Chili peppers.　　(B) Chili Peppers and Spicy Dishes.
(C) Different Tastes all over the World.　(D) Chili Peppers and Globalization.
38. Based on the passages, which of the following is NOT TRUE?
(A) That Thailand uses unprocessed, fresh, ripe chili peppers has started the popularity of chili peppers.
(B) Thailand exports a lot of chili peppers.
(C) Chili peppers are a kind of fruit.
(D) Thai food is normally quite spicy.
39. What does **per capital consumption** mean?
(A) amount consumed per person within a specific population.
(B) capital population and its consumption.
(C) capital with that the government provides each person for food consumption.
(D) capital that each person can get for their daily food consumption.
40. What is the main idea of the last paragraph?
(A) Chili peppers are very popular in the United States.
(B) The use of chili peppers in the United States is being influenced by Thailand.
(C) Chili peppers are made into different toys.
(D) Chilli peppers have made a rock band very hot.

IV. Essay. 20 points.

Please write a well-structured essay on how you can prepare yourself for living in a diverse and more global society in 150 to 200 words discussing your opinions.

高雄醫學大學 99 學年度 研究所 招生考試 考試科目: 生物化學

一、解釋名詞：每題二分 20 %

1. apoptosis
2. ROS
3. epigenetics
4. RNAi
5 oncogene
6. ubiquitin
7. affinty chromatography
8. cell cycle
9. gluconeogenesis
10. antigen

二、簡答題： 每題三分 30 %

1. 請寫出三種人體可代謝利用的六碳醣？
2. 說明 pyruvate 轉換成 acetyl-CoA 主要由那種酵素參與？
3. 必需脂肪酸有那些？
4. 請寫出含 aromatic side chains 三種胺基酸？
5. 何謂 Okazaki fragments？
6. Pentose phosphate pathway 主要代謝產物為那兩種？
7. Electron transfer chain 在那三個 complex 會產生 ATP？
8. 寫出三種由 cholesterol 代謝合成的人體 hormone？
9. 何謂 leptin 有何功能？
10. 何謂 silent mutation？

二、問答題： 每題十分 50 %

(一)、何謂 enzyme？antibody？請說明兩者的蛋白質結構及功能特性有何異同之處？
(二)、請寫出 tricarboxylic acid cycle 中間代謝產物有那些及產能位置？
(三)、說明奇數含 17 個碳 fatty acid 如何完整代謝產生能量？
(四)、引起 DNA damage 常見因子有那些？有那些 DNA repair system？
(五)、敘述水溶性維生素有那些？並說明其生理生化的功能？

1. 選擇題 (60%)　共 8 頁

1. Which of the following terms is not used to describe a parameter of DNA topology?
a. wobble
b. writhe
c. twist
d. linking number

2. Which structural property of DNA is crucial for the conservation of genetic information?
a. antiparallelism
b. the ability to form a double helix
c. base-pair complementarity
d. all of the above

3. Which of the following are removed from mRNAs during processing?
a. exons
b. noncoding sequences
c. RNA cap structure
d. poly(A) tail

4. The base in the wobble position of a codon
a. is the 5′ (first) base.
b. is the 3′ (third) base.
c. is the second base.
d. often contains adenine.

5. RNA composes all or part of
a. termination factors.
b. small nuclear ribonucleoproteins.
c. DNA polymerase.
d. ribozymes.

6. Which of the following is not a recognized stage of protein synthesis in both prokaryotes and eukaryotes?
a. elongation
b. initiation
c. translation
d. termination

7. Which of the following factors recognizes the UAG, UAA, and UGA codons?
a. RNA polymerase
b. DNA polymerase
c. termination factors
d. elongation factors

8. Which of the following structures interacts with ribosomes?
a. tRNA
b. mRNA

c. rRNA

d. all of the above

9. Which of the following is not required for both DNA replication and RNA transcription?

a. DNA

b. primers

c. RNA

d. proteins

10. Which of the following lead(s) to a point mutation?
a. deamination of a cytosine base into a uracil base
b. benzo(*a*)pyrene conversion of guanine to a thymine base
c. deamination of 5-methyl cytosine into thymine
d. all of the above

11. When p53 activated during severe DNA damage, which of the following occur(s)?

a.It induces apoptosis.

b.It is a transcription factor.

c.It serves as a tumor suppressor.

d.all of the above

12. Which of the following are enzymes that play a key role in the base excision repair of nucleotide mismatches and damaged bases?

a. glycosamines
b. glycosidases
c. glycosylases
d. none of the above

13. A mutation that changes a cysteine codon to a tryptophan codon is called
a. a missense mutation.
b. a nonsense mutation.
c. a frameshift mutation.
d. a silent mutation.

14. Crossing of a homozygous wild type with a mutant that is heterozygous for a dominant mutation will result in F_1 progeny of which
a. all show the mutant phenotype.
b. half show the wild-type phenotype and half show the mutant phenotype.
c. three-fourths show the wild-type phenotype and one-fourth show the mutant phenotype.
d. all show the wild-type phenotype.

15. A mutation in one gene that counteracts the effects of a mutation in another gene is known as a
a. temperature-sensitive mutation.
b. recessive mutation.
c. conditional mutation.
d. suppressor mutation.

16. Which of the following enzymes will produce a blunt end (the cut site is indicated by the * in the recognition sequence)?
a. *Taq*I (T*CGA)
b. *Eag*I (C*GGCCG)
c. *Eco*RV (GAT*ATC)
d. *Nsi*I (ATGCA*T)

17. Which of the following is a functional element of a plasmid?
a. origin of replication
b. drug-resistance gene
c. polylinker sequence
d. a and b
e. all of the above

18. All the following statements about λ phage are true except:
a. λ phage lyse *E. coli* upon release of newly synthesized phage.
b. Foreign DNA up to approximately 50 kilobases can be cloned into λ phage.
c. Both cDNA and genomic DNA can be cloned into λ phage.
d. λ Phage consists of a head and tail region.

19. The polymerase chain reaction (PCR) technique can be used for
a. direct isolation of a specific segment of genomic DNA.
b. preparation of probes.
c. synthesis of RNA from genomic DNA.
d. a and b
e. all of the above

20. Southern blotting is used to detect a specific
a. DNA.
b. RNA.
c. protein.
d. carbohydrate.
e. all of the above

21. A mutation that changes the recognition sequence for the restriction enzyme *Eco*RI from GAATTC to GATTTC is an example of a
a. restriction fragment length polymorphism (RFLP).
b. single nucleotide polymorphism (SNP).
c. simple sequence repeat (SSR).
d. a and b
e. all of the above

22. Linkage studies can map disease genes with a resolution of about one centimorgan. Typically, a DNA region this size could contain about _____ genes.
a. 1 or 2
b. 10–50
c. 100–200
d. 1000–2000

23. A haplotype is a set of closely linked genetic markers on a particular chromosome that tend to be inherited together. The genetic technique that looks at inheritance patterns and uses haplotypes in determining gene locations is
a. linkage mapping.
b. linkage disequilibrium mapping.
c. candidate gene approach.
d. all of the above.

24. Which of the following is a typical feature of prokaryotic genes?
a. polycistronic messenger RNAs
b. complex transcription units
c. introns
d. a and c

25. In eukaryotes, tandemly repeated genes encode
a. rRNAs.
b. cytoskeletal proteins.
c. -globin.
d. all of the above

26. Which of the following organisms has the greatest amount of DNA per cell?
a. chicken
b. fruit fly
c. tulip
d. human

27. All the following statements about microsatellite DNA are true except
a. It consists of a repeat length of 1–13 base pairs.
b. It can cause neurological diseases such as myotonic dystrophy.
c. It can occur within transcription units.
d. all of the above

28. Mobile DNA elements likely contributed to the evolution of higher organisms by the
a. generation of gene families by gene duplication.
b. creation of new genes by exon shuffling.
c. formation of more complex regulatory regions.
d all of the above

29. All of the following statements about mitochondrial DNA are true except
a. Mammalian mitochondrial DNA contains introns.
b. In mice, 99.99 percent of mitochondrial DNA is maternally inherited.
c. Mitochondrial DNA encodes rRNAs and tRNAs.
d. The human mitochondrial genome is smaller than the yeast mitochondrial genome.

30. How many genes are estimated to be in the human genome?
a. 25,000
b. 35,000
c. 75,000
d. 100,000

31. All the following statements are true about a nucleosome except
a. It contains an octamer core of histones
b It is about 10 nm in diameter
c. It is the “string” of the “beads-on-a-string” appearance
d. It contains approximately 150 base pairs of DNA

32. All of the following can be found in chromatin except
a. DNA.
b. histones.
c. RNA.
d. transcription factors.

33. In mammals, X-chromosome inactivation
a. occurs in half the diploid cells of the adult female.
b. results from the ionization of the X-chromosome.
c. is considered an epigenetic event.
d. b and c

34. Chromosome painting involves
a. staining chromosomes with Giemsa reagent.
b. hybridizing fluorescent probes to chromosomes.
c. hybridizing radioactive probes to chromosomes.
d. a and b

35. All the following statements about heterochromatin except
a. It is a dark-staining area of a chromosome.
b. It is usually transcriptionally active.
c. It is often simple sequence DNA.
d. It is a region of condensed chromatin.

36. Operator constitutive mutants of the *lac* operon would
a. express the *lac* repressor constitutively.
b. block the binding of RNA polymerase to the promoter.
c. express -galactosidase constitutively.
d. prevent the inducer from binding to the repressor.

37. How does binding of the *lac* repressor to the *lac* operator block transcription initiation?
a. *lac* repressor binding blocks RNA polymerase from interacting with DNA at the start site
b. *lac* repressor binding induces a DNase that cleaves the DNA at the transcription start site
c. *lac* repressor binding causes a conformational change in RNA polymerase
d. *lac* repressor binding induces a protease that degrades the sigma subunit of RNA polymerase

38. All of the following statements about the essential carboxy terminal domain (CTD) of RNA polymerase are true except
a. The CTD is present in RNA polymerase I, II, and III.
b. The CTD can become phosphorylated.
c. The CTD is critical for viability.
d. The CTD of mammals contains more than 50 repeats of a heptapeptide.

39. An enhancer
a. is a DNA element that stimulates transcription of eukaryotic promoters.
b. binds to RNA polymerase and stimulates transcription.
c. acts as a binding site for RNA polymerase.
d. interacts with repressor proteins to enhance transcriptional repression.

40. The TATA box

a. serves as a promoter sequence for genes transcribed by RNA polymerase III.
b. is located approximately 100 base pairs upstream of the start site for mRNAs.
c. is present in all eukaryotic genes.
d. acts to position RNA polymerase II for transcription initiation.

41. All the following elements can function as eukaryotic promoters except
a. a TATA box.
b. an initiator element.
c. CpG islands.
d. an enhancer.

42. Which of the following proteins does not “footprint” the *lac* operon control region?
a. lac repressor
b. -galactosidase
c. RNA polymerase

43. Which of the following is not a structural motif found in a DNA-binding domain?
a. homeodomain
b. zinc-finger
c. helix-loop-helix
d. random-coil acidic domain

44. Which of the following is the correct order of binding of general transcription factors to initiate transcription at RNA polymerase II promoters?
a. TFIID, TFIIB, Pol II, TFIIH
b. PolII, TFIID, TFIIB, TFIIH
c. TFIIB, PolII, TFIIH, TFIID
d. TFIID, TFIIH, TFIIB, PolII

45. What is the function of TFIIH in the transcription initiation complex?
a. binding to the TATA box
b. unwinding the DNA duplex
c. catalyzing the synthesis of RNA
d. all of the above

46. All the following statements about heterochromatin are true except
a. Heterochromatin stains more darkly with DNA dyes than does euchromatin.
b. Heterochromatin contains more highly condensed DNA than does euchromatin.
c. Heterochromatin is associated with inactive genes.
d. Heterochromatin is more susceptible to DNaseI than is euchromatin.

47. The mediator complex
a. can form a molecular bridge between activators of transcription and DNA replication machinery.
b. can function to maintain a promoter in a hypoacetylated state.
c. has histone acetylase activity.
d. none of the above

48. Transcriptionally inactive genes
a. are always located within euchromatin.

b. are not located within nucleosomes.
c. often are methylated.
d. are not resistant to DNase I.

49. Which of the following statement(s) regarding the transcription initiation and RNA Pol III is (are) true?
a. ATP hydrolysis is not required for initiation.
b. Pol III is responsible for synthesizing tRNAs and 5S-rRNA.
c. The promoter elements of tRNA genes lie entirely within the transcribed sequence.
d. all of the above

50. The consensus sequence for poly(A) addition is
a. the site of poly(A) tail addition.
b. AAUAAA.
c. downstream of the cleavage site.
d. none of the above

51. Histone mRNAs lack
a. poly(A) tails.
b. introns.
c. a 3´UTR.
d. all of the above

52. Which process involves two transesterification reactions?
a. splicing
b. RNA editing
c. capping
d. nuclear transport

53. Splice sites in pre-mRNA are marked by two universally conserved sequences contained
a. in the middle of the intron.
b. at the ends of the exons.
c. at the ends of the introns.
d. none of the above

54. Indicate the order in which the following steps occur in the production of a mature mRNA.
a. initiation of transcription, splicing, addition of 5´' cap, addition of poly(A) tail, transport to cytoplasm
b. initiation of transcription, addition of 5´ cap, splicing, addition of poly(A) tail, transport to cytoplasm
c. initiation of transcription, addition of poly(A) tail, addition of 5´ cap, splicing, transport to cytoplasm
d. initiation of transcription, addition of 5´ cap, addition of poly(A) tail, splicing,

55. Components of the spliceosome include
a. a single snRNP containing several different snRNAs
b. proteins that react immunologically with the sera of patients with systemic lupus erythematosus
c. U5 snRNA, which interacts with the 5´ splice site in pre-mRNA
d. all of the above

56. Which of the following does not require protein enzymes?
a. RNA editing
b. excision of group II introns

c. transsplicing
d. excision of group III introns

57. Which of these events does not occur within the nucleus?
a. RNA editing in mammals
b. RNA capping
c. polyadenylation
d. RNA editing in protozoans

58. Which type of RNA participates in nuclear export of mRNA?
a. snRNA
b. hnRNA
c. tRNA
d. rRNA
59. microRNAs play a key role in which of the following?
a. translational repression
b. viral RNA degradation
c. RNA interference
d. all of the above

60. The 45S pre-rRNA molecule
a. can organize a nucleolus when present in a single copy.
b. is encoded by genes that are tandemly arranged.
c. is methylated on specific bases.
d. all of the above

2. 簡答及問答題 (40%)

1. A double-stranded piece of DNA containing the sequence GCATGGCCACTACCG has a higher Tm than one containing the sequence GAATGGTAACAACTG. Describe the properties of DNA that make this true. (5%)

2. If perfect Watson-Crick base pairing were demanded between codons and anticodons, cells would need 61 different tRNAs. If there are only 20 amino acids used in protein synthesis, how would you explain this excess number of tRNAs compared to amino acids? Conversely, how would you explain the fact that some cells contain fewer than 61 tRNAs? (5%)

3. What is the difference between lytic and lysogenic bacteriophages? (5%)

4. Describe some typical features of a restriction enzyme recognition sequence. (5%)

5. Compare the advantages and limitations of microarrays and Northern blots for analyzing gene expression. (5%)

6. How can linkage analysis position genes on a chromosome? (5%)

7. In animal cells, nearly all cytoplasmic mRNAs have a5’-Ccap and 3´ poly(A) tail, which is added to the pre-mRNA before splicing. What proteins are involved in polyadenylation? How is the 5´-Cap added to nascent RNAs? Indicate their order of association with pre-mRNA and their functions. (10%)