

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2012.

Ph.D. (CARDIOVASCULAR BIOLOGY)

COURSE CODE : 163

Register Number :

*Signature of the Invigilator
(with date)*

COURSE CODE : 163

Time : 2 Hours

Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. A Screening test should have
 - (A) High sensitivity and high specificity
 - (B) Low sensitivity and Low specificity
 - (C) High sensitivity and Low specificity
 - (D) Low sensitivity and high specificity

2. In a statistically sound study Type II error should be
 - (A) $\leq 5\%$
 - (B) $\leq 10\%$
 - (C) $\leq 15\%$
 - (D) $\leq 20\%$

3. _____ results if you fail to reject the null hypothesis when the nul hypotheis is actually false.
 - (A) Type I error
 - (B) Type II error
 - (C) Type III error
 - (D) Type IV error

4. The formula for sample size calculation when proportion is the parameter of study
 - (A) $Z^2 \times S^2 / d^2$
 - (B) $Z^2 \times p \times q / d^2$
 - (C) $(Z_\alpha + Z_\beta)^2 p \times q \times 2/d^2$
 - (D) $(Z_\alpha + Z_\beta)^2 \times S^2 \times 2/d^2$

5. 1% level of significance indicates
 - (A) $M \pm SD$
 - (B) $M \pm 2SD$
 - (C) $M \pm 3SD$
 - (D) $M \pm 4SD$

6. Normally distributed data is
 - (A) Symmetrical and all values are close to each other
 - (B) Mean, median and mode are different
 - (C) Asymmetrical about its mean
 - (D) Total area is one square unit

7. Cohort study includes
 - (A) Comparision of individuals with and without disease
 - (B) Comparision of individuals exposed and not exposed to a risk factor
 - (C) Manipulation of a situation followed by measurement of the effects of manipulation
 - (D) Systematic collection and presentation of data to give a clear picture of a particular situation.

8. The method commonly used for reducing experimental bias
- (A) Sampling (B) Intervention
(C) Randomization (D) Estimation of mean
9. Standard deviation is an example of
- (A) Central tendency (B) Significance testing
(C) Normally distributed data (D) Dispersion of data
10. Which of the following is NOT a statistical computing software?
- (A) Epi Info (B) Graphpad
(C) SPSS (D) SCORE
11. The method(s) for detecting association in genetic diseases
- (A) Case – control studies (B) Family based controls
(C) Transmission disequilibrium test (D) All of the above
12. LOD score is
- (A) \log_{10} of likelihood ratio (B) Increase of likelihood ratio
(C) Score for calculating mortality rates (D) Score for calculating relative
13. Most common approach for allele sharing is
- (A) Affected sibling pair (ASP) (B) Calculating likelihood ratio
(C) Calculating odds ratio (D) Calculating relative risk
14. A condition or characteristic that can take on different values or categories is called
- (A) A constant (B) A variable
(C) A cause-and-effect relationship (D) A descriptive relationship
15. A positive correlation is present when
- (A) Two variables move in opposite directions
(B) Two variables move in the same direction
(C) One variable goes up and one goes down
(D) Several variables never change

16. The strongest evidence for causality comes from which of the following research methods?
- (A) Experimental (B) Causal-comparative
(C) Correlational (D) Ethnography
17. Which correlation is the strongest?
- (A) +.10 (B) -.95
(C) +.90 (D) -1.00
18. The research participants are described in detail in which section of the research plan?
- (A) Introduction (B) Method
(C) Data analysis (D) Discussion
19. If a test measures a single construct then :
- (A) The items should correlate with the total score
(B) The items should not correlate with the total score.
(C) The test should not correlate with other measures of the same construct
(D) There must be a reliable alternative form
20. Which scale is the simplest form of measurement?
- (A) Nominal (B) Ordinal
(C) Interval (D) Ratio
21. Simple diffusion
- (A) Is a downhill process where no energy is required
(B) Possesses maximum rate beyond which the rate cannot be increased
(C) Requires energy
(D) None of the above
22. $\text{Na}^+\text{-K}^+$ pump
- (A) Is an example of secondary active transport
(B) Does not require energy
(C) Pumps two Na^+ ions outward and three K^+ ions inward with each cycle
(D) Is an example of primary active transport mechanism

23. Simple diffusion through lipid bilayer of cell membrane involves
- (A) Water-soluble substances (B) Lipid-soluble substances
(C) Glucose (D) Amino acids
24. Facilitated diffusion
- (A) Required energy
(B) Is an uphill process
(C) Occurs with the help of a protein carrier and does not require energy
(D) None of the above
25. Gibbs-Donnan effect state that the presence of non-diffusible ions on one side of semipermeable membrane
- (A) Causes unequal distribution of diffusible ions across the membrane
(B) Is responsible for the development of transmembrane potential
(C) Causes solutions of both the compartments to be electrically neutral at equilibrium
(D) All of the above
26. Water molecules pass through
- (A) Pores of cell membrane (B) Lipid bilayer
(C) Both of the above (D) None of the above
27. Rate of diffusion through cell membrane is directly proportional to
- (A) Concentration gradient (B) Molecular weight
(C) Supply of energy (D) Thickness of membrane
28. Function of endoplasmic reticulum of cell is
- (A) To produce energy (B) Store granules
(C) Synthesis of proteins (D) None of the above
29. Total number of chromosomes in somatic cells is
- (A) 48 (B) 46 (C) 22 (D) 26
30. In the following types of cell division, the number of chromosomes is halved
- (A) Mitosis (B) Meiosis
(C) Division of neuron (D) None of the above

31. Heat loss mechanisms are initiated by
- (A) Posterior hypothalamus (B) Preoptic area of hypothalamus
(C) Thalamus (D) Mamillary bodies
32. Homeothermic animal is the one
- (A) In whom temperature of the body changes with change in the atmospheric temperature
(B) In whom temperature of the body is maintained within narrow limits
(C) In whom heat loss is greater than the heat gain
(D) In whom heat gain is greater than heat loss
33. BMR
- (A) Increased in cold season
(B) Increases on reducing the levels of T_3 T_4
(C) Is more in females than in males of same age
(D) All of the above
34. Mechanism of heat loss when the surrounding temperature is higher than the body temperature is
- (A) Radiation (B) Conduction
(C) Convection (D) Evaporation
35. Blood supply to the skin
- (A) Has arteriovenous anastomoses in the exposed areas of the body
(B) Can change from 2% of cardiac output to 30% of cardiac output
(C) Is under control of hypothalamus
(D) All of the above
36. Subcutaneous fat
- (A) Is heat insulator
(B) Is helpful in maintaining core temperature
(C) Conducts heat less readily
(D) All of the above

37. Radiation

- (A) Causes heat loss in the form of electromagnetic waves
- (B) Causes heat loss from the body of high temperature to the body of low temperature
- (C) Loss depends on temperature difference between surface of the skin and environment
- (D) All of the above

38. Convection

- (A) Aids conductive heat loss
- (B) Is increased when hypothalamus is stimulated
- (C) Is increased when fans are off
- (D) None of the above

39. Following are behavioral responses for altering heat loss, EXCEPT

- (A) Curling up in bed
- (B) Use of woolen clothes
- (C) Seeking warmer or colder surroundings
- (D) Sweating

40. Hypothalamic thermostat is the set point at

- (A) 37°C
- (B) 38°C
- (C) 90°C
- (D) 39°C

41. Total blood volume in 70 kg man

- (A) Volume tends to rise when fluid is lost
- (B) Is 7% of body weight
- (C) Does not vary with surface area
- (D) Is 7-8L

42. Specific gravity of

- (A) Red blood cells is lesser than that of plasma
- (B) Plasma is related to its protein content
- (C) Blood is 1010
- (D) Plasma is related to its electrolyte content

43. Viscosity of blood
- (A) Rises when plasma protein concentration rises
 - (B) Is more when measured *in vivo* than *in vitro*
 - (C) Increases in severe anemia
 - (D) None of the above
44. Hematocrit
- (A) Is determined by Wintrobe's method
 - (B) Is 55%
 - (C) Measured by Wintrobe's method is same as true hematocrit
 - (D) Of arterial blood is higher than that of venous blood
45. Specific gravity
- (A) Of RBC's is 1000
 - (B) Of plasma is 1030
 - (C) Of plasma is 1090
 - (D) None of above
46. Albumin
- (A) Is mainly responsible for colloid osmotic pressure
 - (B) Has a lesser concentration in plasma than globulin
 - (C) Is synthesized in lymph nodes
 - (D) None of the above
47. Fibrinogen level of blood is
- (A) 500-600 mg/100 ml
 - (B) 10-20 mg/100 ml
 - (C) 150-300 mg/100 ml
 - (D) 1000-2000 mg/100 ml
48. Viscosity of blood depends on
- (A) Amount of plasma proteins
 - (B) Number of cells in blood
 - (C) Temperature
 - (D) All of the above
49. Total body water is determined by using
- (A) Radio isotope of sodium
 - (B) Deuterated water (D₂O)
 - (C) ¹²⁵I-labeled albumin
 - (D) None of the above

50. Plasma volume
- (A) Is 55%
 - (B) Is measured by using ^{131}I -labeled albumin
 - (C) Is 3 l
 - (D) All of the above
51. Process of digestion
- (A) Is a process of hydrolysis
 - (B) Converts insoluble large molecules into simple soluble molecules
 - (C) Converts food into absorbable form
 - (D) All of the above
52. Total length of gastrointestinal tract in adults is
- (A) 15 m
 - (B) 15 feet
 - (C) 4 feet
 - (D) 30 m
53. Mastication
- (A) Though voluntary, is coordinated by chewing reflex
 - (B) Causes grinding of food
 - (C) Is a stretch reflex initiated by the presence of bolus in the mouth
 - (D) All of the above
54. Incisors
- (A) Help in grinding the food
 - (B) Are two in number
 - (C) Are four in number in children
 - (D) Help in cutting of food
55. GI tract muscle wall
- (A) Is formed of multiunit type of smooth muscle
 - (B) Contracts on sympathetic stimulation
 - (C) Relaxes on parasympathetic stimulation
 - (D) None of the above

56. Following is true about salivary glands
- (A) Parotid glands mainly cause mucoid secretion
 - (B) Submandibular glands cause serous salivary secretion with high ptyalin content
 - (C) Parasympathetic supply to parotid glands arises
 - (D) Sympathetic stimulation causes large amount of serous secretion from submandibular glands
57. Sympathetic stimulation of salivary glands
- (A) Causes secretion of watery saliva
 - (B) Causes secretion of saliva, which is rich in ptyalin
 - (C) Causes vasoconstriction
 - (D) None of the above
58. Cephalic phase of salivary secretion
- (A) Is unconditioned reflex
 - (B) Occurs by presence of food in mouth
 - (C) Occurs on sight and smell of food
 - (D) All of the above
59. Which of the following statements regarding function of saliva is false?
- (A) Saliva helps in swallowing
 - (B) Ptyalin of saliva digests boiled starch up to a stage of glucose
 - (C) Saliva excretes thiocyanate ions
 - (D) Saliva reduces risks of buccal infections
60. Oral phase of salivary secretion
- (A) Occurs when food is present in mouth
 - (B) Is not controlled by nerves
 - (C) Is a conditioned reflex
 - (D) All of the above
61. What is the cyclical process of collecting and analyzing data during a single research study called?
- (A) Interim analysis
 - (B) Inter analysis
 - (C) Inter-item analysis
 - (D) Constant analysis

62. The process of marking segments of data with symbols, descriptive words, or category names is known as
- (A) Concurring (B) Coding
(C) Coloring (D) Segmenting
63. When a citation includes more than _____ authors, only the surname of the first author is cited followed by et al.
- (A) 3 (B) 4 (C) 5 (D) 6
64. When referencing other works you have cited within the text of the report you should
- (A) State the first and last name of the author
(B) Use the author, date citation method
(C) Use an asterisk and a footnote
(D) Insert the complete citation in parenthesis
65. Where do you provide a step-by-step account of what the researcher and participants did during the research study?
- (A) Introduction (B) Abstract
(C) Methods (D) Design
66. Which of the following is necessary in obtaining informed consent?
- (A) A description of the statistical analyses that will be carried out
(B) A description of the purpose of the research
(C) A description of the reliability and validity of test instruments
(D) A list of publications that the researcher has had in the last ten years.
67. What is the over-riding principle governing ethical research behaviour?
- (A) To protect research participants from harm
(B) To avoid dealing with sensitive topics
(C) To obtain informed consent of the participants
(D) To preserve the anonymity of the participants
68. What is the primary approach that is used by the IRB to assess the ethical acceptability of a research study?
- (A) Utilitarianism (B) Deontology
(C) Ethical skepticism (D) Comparativism

69. Which of the following is not an ethical guideline for conducting research with humans?
- (A) Getting informed consent of the participant
 - (B) Telling participants they must continue until the study has been completed
 - (C) Keeping participant's identity anonymous
 - (D) Telling participants they are free to withdraw at any time
70. Concerning "authorship" in educational research, intellectual ownership is predominantly a function of:
- (A) Effort expended
 - (B) Creative contribution
 - (C) Professional position
 - (D) Level of higher education
71. The following are certain behavioral traits that distinguishes creative individuals from their peers EXCEPT:
- (A) High level of curiosity
 - (B) Unwillingness to learn from experience
 - (C) Preparedness to take risks
 - (D) Persistence in situations of failure
72. Creative thinking differs from critical thinking in which among the following components?
- (A) Analytical
 - (B) Judgemental
 - (C) Selective
 - (D) Divergent
73. Which among the following is an inhibitor of creativity?
- (A) Belief in creativity
 - (B) Recording of ideas
 - (C) Irregular practice of creative thinking
 - (D) Realistic expectations
74. In medical research, "the points we want to reach in a study or in a clinical trial" is known as
- (A) Research problem
 - (B) Research objectives
 - (C) Research hypothesis
 - (D) Research question
75. "A proposition to be evaluated, accepted or rejected by research study and its results" is known as
- (A) Research problem
 - (B) Research objectives
 - (C) Research hypothesis
 - (D) Research question

76. "A tentative explanation for a phenomenon used as a basis for further investigation" is known as
- (A) Research problem (B) Research objectives
(C) Research hypothesis (D) Research question
77. "An expression of doubt and uncertainty about the nature and solution of a health problem in specific context" is known as
- (A) Research problem (B) Research objectives
(C) Research hypothesis (D) Research question
78. In biomedical research, "the group for comparison allowing the establishment of contrasts as a measure of the success of treatment" is known as
- (A) Control (B) Population
(C) Test (D) Setting
79. "There will be statistically significant improvement between depressed men and women after cognitive therapy compared with fluoxetine". This statement is an example of which type of hypothesis?
- (A) One-tailed alternative (B) Two-tailed alternative
(C) One-tailed null (D) Two-tailed null
80. A study was carried out in a population to determine the frequency of a disease, the kind of people suffering from it and the distribution of attributes at one point in time. This type of study is known as
- (A) Cross sectional analytical (B) Longitudinal experimental
(C) Cross-sectional descriptive (D) Longitudinal qualitative
81. A study which determines why one particular group or person is affected by a disease while another is not is known as
- (A) Qualitative (B) Analytical
(C) Experimental (D) Descriptive
82. The following are disadvantages of self – completion questionnaire used in a survey when compared to other methods EXCEPT:
- (A) The responses rates can be low
(B) Inappropriate for populations with high levels of illiteracy
(C) It need to be short and needs to be in simple language
(D) The barriers of embarrassment in collection of sensitive date is more

83. The following are the advantages of face – to – face interviews carried out in a survey EXCEPT:
- (A) Useful in populations with high levels of illiteracy
 - (B) Provides clarification and deals with misunderstandings
 - (C) Easier collection of sensitive data
 - (D) Ensures almost complete collection of information
84. Which type of sampling is most appropriate when interviews are undertaken in a survey?
- (A) Random
 - (B) Probability
 - (C) Systematic
 - (D) Cluster
85. In a study, sampling was carried out at every fourth house. Name the sampling technique involved?
- (A) Random
 - (B) Probability
 - (C) Systematic
 - (D) Cluster
86. Which among the following statements denote reproducibility of results in biochemical assays?
- (A) Accuracy
 - (B) Precision
 - (C) Specificity
 - (D) Sensitivity
87. Which among the following is a free bibliographic software currently available in the market?
- (A) Zotero
 - (B) Biblioscape
 - (C) Bookend
 - (D) Endnote
88. Which among the following is the most commonly used measure of the quality of a journal?
- (A) Evaluation by peers
 - (B) The ISI impact factor
 - (C) Index in major biomedical databases
 - (D) Good public relation services
89. The ISI 2009 impact factor (IF) of a journal is calculated by the following equation, $IF = \frac{\text{No. of citations in 2008 of articles published in 2006 and 2007}}{X}$ where X is the total no. of articles published in
- (A) 2005 and 2006
 - (B) 2006 and 2007
 - (C) 2007 and 2008
 - (D) 2008 and 2009

90. The following are the Rs of Russell and Burch's ethical foundation in carrying out animal experiments EXCEPT:
- (A) Rehabilitation
 - (B) Replacement
 - (C) Reduction
 - (D) Refinement
91. The 'replacement' in animal research refers to
- (A) Use of non-animal research methods where possible
 - (B) Replacement of weak and sick animals with healthy ones
 - (C) Use of evolutionarily higher animals instead of lower animals
 - (D) Replacement of aggressive animals with mild ones
92. What is the ethical foundation of W.M.S. Russell and R.L. Burch's three 'R's practiced in animal experiments?
- (A) Causing pain and distress in animals for any purpose in research is wrong
 - (B) The research should be of sufficient weight to justify any pain and distress caused
 - (C) The pain and distress of animals is overlooked when research of any relevance has to be carried out
 - (D) Animal experiments are permitted if it causes only mild pain and distress to the animals
93. The following statements are in agreement with the 'reduction' practiced in animal experiments EXCEPT
- (A) Avoid unnecessary duplication of studies
 - (B) Reduce animals to the minimum to achieve significant results
 - (C) Use of each animal must be justified
 - (D) Arbitrary reduction of numbers as much as possible even if it results in insignificant results
94. Which among the following statements is FALSE regarding the ethics of medical research among children?
- (A) Children can be involved in research that could be carried out equally well with adults
 - (B) A parent or legal guardian of each child has to give proxy consent
 - (C) The research should be conducted in settings in which the child and parent can obtain adequate medical psychological support
 - (D) The child's refusal to participate in research must always be respected unless there is no medically acceptable alternative

95. The value around which the observations tend to be most heavily concentrated in a study is known as:
- (A) Average (B) Mean
(C) Median (D) Mode
96. The more important requirement for good research is
- (A) Quality of human resources in the laboratory
(B) Good furniture and elegant building
(C) Advanced equipments
(D) Good library facility
97. The steps in the systematic
- (A) Formulate clear questions – selection of idea – identifying the problem – experimental design
(B) Identifying the problem – selection of idea – formulate clear questions – experimental design
(C) Formulate clear questions – identifying the problem – Selection of idea – experimental design
(D) Selection of idea – identifying the problem – formulate clear questions – experimental design
98. A research finding may be tentatively accepted to be scientifically true provided the probability is at least greater than
- (A) 65% (B) 85% (C) 95% (D) 75%
99. The following statement about “hypothesis” is correct
- (A) Hypothesis is a formal statement of expected answer
(B) Hypothesis cannot predict a relationship between known facts
(C) Hypothesis is essential even if you want to build a data base
(D) Hypothesis cannot be tested
100. The sampling method in which every member of the population has an equal chance of being selected for the study is called
- (A) Systematic sampling (B) Incidental sampling
(C) Random sampling (D) Convenience sampling