

ENTRANCE EXAMINATION, JUNE 2018 QUESTION PAPER BOOKLET  
M.Sc. (Neural and Cognitive Sciences)

Marks: 100  
Time: 2.00 hrs.

Hall Ticket No. \_\_\_\_\_

1. Write your Hall Ticket Number in the OMR Answer Sheet given to you. Also write the Hall Ticket Number in the space provided above.
2. Read carefully the following instructions:
  - a. This Question paper has Two Sections: Section- A and Section- B
  - b. Section - A has 40 and Section - B has 60 objective type questions of one mark each.
  - c. **There is negative marking for all the questions in sections A and B. Each wrong answer carries -0.33 mark.**
  - d. Answers are to be marked on the OMR answer sheet following the instructions provided there upon.
  - e. Calculators are permitted. Logarithmic tables are not allowed
  - f. Hand over the OMR answer sheet at the end of the examination to the Invigilator.
  - g. No additional sheets will be provided. Rough work can be done in the question paper itself/space provided at the end of the booklet.

## SECTION A

1. Which value will the series  $1/2 - 1/4 + 1/8 - 1/16 + 1/32 + \dots$  converge to?
- A.  $1/4$
  - B.  $2/3$
  - C.  $1/3$
  - D.  $5/4$
2. In a certain language, SIKKIM is written as RJLHN how is TRAINING written in that code?
- A. SSZJMIMH
  - B. UQBHSSOF
  - C. UQSSOHHO
  - D. UQBJSHOH
3. Leelavati had a triangle in mind. Its longest side has length 20 and another one of its sides has length 10. Its area is 80. What is the exact length of its third side?
- A.  $\sqrt{260}$
  - B.  $\sqrt{250}$
  - C.  $\sqrt{240}$
  - D.  $\sqrt{230}$
4. Which among the following is the simplification of the expression  $\log((a+b)^2b)$ ?
- A.  $2\log(a+b)\log(b)$
  - B.  $\log(a^2b)+\log(b^3)$
  - C.  $2\log(a+b)+\log(b)$
  - D. None of the above
5. A box of twenty pens (red, blue and green pens) has an average cost of Rs. 20 per pen. There are eleven red pens having an average cost equal to the average cost of the pens in the box. There are seven blue pens having an average cost of Rs. 22 per pen. What is the average cost of the two green pens?
- A. Rs. 29
  - B. Rs. 13
  - C. Rs. 27
  - D. None of the above

6. In the correctly worked out multiplication problem below, each letter represents a different digit. What is the value of P?

$$P2Q \times Q = 312Q$$

- A. 4  
 B. 5  
 C. 6  
 D. None of the above
7. If  $\frac{2d-3n}{7n-d} = 1$ , which of the following statements describes  $d$  in terms of  $n$ ?
- A.  $d$  is 5 times  $n$ .  
 B.  $d$  is 4 more than  $n$ .  
 C.  $d$  is  $\frac{10}{3}$  of  $n$ .  
 D.  $d$  is  $\frac{4}{3}$  of  $n$ .
8. Which of the following statements are true about the graph of  $y = x^2 + 3x + 4$ ?
- I. The graph does not cut the  $x$ -axis.  
 II. The graph is entirely to the right of  $y$ -axis.  
 III. The graph touches the  $x$ -axis.  
 IV. The  $y$ -axis is not the line of symmetry for the graph.  
 V. The graph cuts the  $x$ -axis at two distinct points.
- A. I and IV only  
 B. I and II only  
 C. III alone  
 D. IV and V alone
9. If  $j$  represent imaginary number ( $j = \sqrt{-1}$ ) what would be  $(3+2j)(j+1)$
- A.  $4+3j$   
 B.  $5j+1$   
 C.  $5j$   
 D.  $7j+3$
10. If a bee is travelling straight from its hive to a cluster of flowers with velocity  $v$  m/sec for half the total time to reach the flowers.  $2v$  m/sec for quarter of the time and  $v/2$  m/sec for the rest to the time. What is bees average velocity.
- A.  $v$  m/sec  
 B.  $7v/8$  m/sec  
 C.  $5v/9$  m/sec  
 D.  $9v/8$  m/sec

11. Find the mode of the following data : 12, 8, 4, 8, 1, 8, 9, 11, 9, 10, 12, 8

- A. 5
- B. 8
- C. 11
- D. 12

12. A cone and a hemisphere have equal bases and equal volumes. Find the ratio of their heights.

- A. 1:2
- B. 2:1
- C. 3:1
- D. 3:4

13. One year ago, ratio of Harry and Peter age's was 5 : 6 respectively. After 4 years, this ratio becomes 6 : 7. How old is Peter?

- A. 25 years
- B. 26 years
- C. 31 years
- D. 35 years

14. Pick odd man out.

- A. Fish
- B. Crab
- C. Tortoise
- D. Frog

15. Ex Post Facto research means

- A. The research is carried out after the incident
- B. The research is carried out prior to the incident
- C. The research is carried out along with the happening of an incident.
- D. The research is carried out keeping in mind the possibilities of an incident.

Read the following information carefully and answer the questions no. 16 to 20 that follows.

- I. A, B, C, D, E and F are six students procuring their Master's degree in six different subjects- Education, Hindi, Philosophy, Physics, Neuroscience and Mathematics.
- II. Two of them stay in hostel; two stay as paying guest (PG) and the remaining two stay at their home.
- III. C does not stay as PG and studies Philosophy.
- IV. The students studying Neuroscience and Hindi do not stay as PG.
- V. E studies Mathematics and D studies Physics.
- VI. F and D stay in hostel. E stays as PG and B stays at home.

16. Who studies Education?

- A. C
- B. D
- C. E
- D. None of these

17. Which of the following combinations of subjects and place of stay is not correct?

- A. Education- Hostel
- B. Mathematics- PG
- C. Philosophy- Home
- D. None of these

18. Which of the following pairs of students stay one each at hostel and at home?

- A. BC
- B. DC
- C. FD
- D. Data inadequate

19. Which subject does B study?

- A. Hindi
- B. Neuroscience
- C. Hindi or Neuroscience
- D. Data inadequate

20. Which of the following pairs of students stay at home?

- A. AB
- B. BC
- C. CD
- D. DE

21. What is Interquartile range where  $Q_1$ ,  $Q_2$ ,  $Q_3$  are first, second and third quartiles respectively?

- A.  $Q_3 - Q_1$
- B.  $Q_3 + Q_1$
- C.  $Q_2$
- D.  $Q_1 + Q_2 + Q_3$

22. Pick the choice that best completes the following sentence. If a relationship between two variables is called statistically significant, it means the investigators think the variables are

- A. related in the population represented by the sample.
- B. not related in the population represented by the sample.
- C. related in the sample due to chance alone.
- D. very important.

23. In a normal distribution,

- A. Mean is always greater than the median
- B. Mean is always lesser than the median
- C. Mean is equal to the median
- D. There is no relationship between the mean and the median

24. Which one of the following measurement does not divide a set of observations into equal parts?

- A. Quartiles
- B. Standard Deviations
- C. Deciles
- D. Median

25. If the occurrence of one event means that another cannot happen, then the events are

- A. Independent
- B. Mutually Exclusive
- C. Bayesian
- D. Empirical

26. Which of the following is spelt correctly?

- A. rendezvous
- B. rondavous
- C. rendevous
- D. randavous

27. There are twenty four students in a certain class. For every nine girls there are three boys. How many girls and how many boys are there in the class?

- A. 19 and 5
- B. 18 and 6
- C. 15 and 9
- D. 14 and 10

28. A candidate attempted 12 questions and secured full marks in all of them. If he obtained 60% in the test and all questions carried equal marks, then what is the number of questions in the test?

- A. 36
- B. 30
- C. 25
- D. 20

29. A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is D related to A?

- A. Grandmother
- B. Granddaughter
- C. Grandfather
- D. Daughter

• 30. 5, 26, 131, 656, ?

- A. 1285
- B. 3281
- C. 1321
- D. None of the above

31. If in a certain language, REMOTE is coded as ROTEME, which word would be coded as TMAE?

- A. MEAT
- B. TEAM
- C. MATE
- D. TAME

Q-17

32. The volume of a cylinder whose height is twice its radius  $r$  is given by:

- A.  $2\pi r^3$
- B.  $\pi r^3$
- C.  $2\pi r^2$
- D.  $(4/3)\pi r^3$

33. Find the odd one out in the following options:

- A. Keyboard
- B. Mouse
- C. Microphone
- D. Laser Pointer

34. A man travelled a distance of 80 km in 7 hours partly on foot at 8 km/hr and partly on bicycle at 16 km/hr. Find the distance travelled on foot.

- A. 32 km
- B. 5 km
- C. 40 km
- D. None of the above

35. Number of water molecules in 18 grams of ice is how many times the number of carbon atoms in 12 grams of carbon?

- A.  $3/2$
- B. 3
- C. Same
- D. Twice

36. The solar eclipse occurs when:

- A. the earth comes between the sun and the moon
- B. the sun comes between the earth and the moon
- C. the moon comes between the sun and the earth
- D. the earth, the sun and the moon are equidistant from each other



37. Complete the following sentence with the most appropriate alternative.

We are adding a new healthcare policy to our current health plan ..... the benefit of our workers. We want everyone who works here to be healthy and to have the best healthcare plan.

- A. at
- B. to
- C. by
- D. for

38. What is the missing term in the following series: JQ, LO, OL, \_\_, XC?

- A. SK
- B. RH
- C. RK
- D. SH

39. If two of the angles of a polygon are obtuse angles and all its sides are equal, the minimum number of sides it should have are

- A. 3
- B. 4
- C. 5
- D. 6

40. The diamond glitters due to

- A. refraction of light falling on it
- B. total reflection of light from its top surface
- C. a combination of phenomena in (b) and (c)
- D. total internal reflection of light

### SECTION B

41. We cannot see ultra violet electromagnetic radiation because

- A. It does not have colour
- B. Our eyes do not have appropriate sensors
- C. Ozone layer cuts it off
- D. It is absorbed by the lens of the eye

42. If I inject 0.5amps for 1 second in to a capacitor I get 1V across the capacitor plates. What is the value of the capacitor?

- A.  $0.5/(4\pi\epsilon)$  Farad
- B. 2 Farad
- C. 0.5 Farad
- D.  $2/(4\pi\epsilon)$  Farad

43. Sound in a medium has a frequency of 2 Hz and a wavelength of 100m. How long does it take for it to travel 400m?

- A. 20sec
- B. 1/2sec
- C. 0.5sec
- D. 2sec

44. You want to add a strip of copper on the circular wall of your experimental setup such that it fits the field of view of the subject at the centre of the room. The field of view of the subject is 45 degrees and radius of the room is 2m. What should be the length of the strip you should use?

- A. 2
- B.  $\pi/2$
- C.  $2\pi$
- D.  $\frac{1}{2}$

45. A prism is able to split white light in to colours because

- A. Reflectivity depends on refractive index
- B. Refractive index depends on wavelength
- C. Scattering by doping in the glass
- D. Glass has high refractive index

46. To find distance to and estimate velocity of the target a bat that uses echolocation can use

- A. Echo time and echo amplitude respectively
- B. Echo amplitude and Doppler shift respectively
- C. Echo time and Doppler shift respectively
- D. Doppler shift and echo amplitude respectively

47. If you have created a light emitting diode of ultraviolet frequency, you can use the following phenomena to get white light

- A. Reflection
- B. Phosphorescence
- C. Fluorescence
- D. Chemiluminescence

48. The electric current in a circuit follows the relation  $I = 100\sin(\pi 50t)$ . How long will it take for the electric current to rise to 100 A after reaching zero?

- A. 2 msec
- B. 20 msec
- C. 5 msec
- D. 10 msec

49. A body of mass  $M$  moving with velocity  $u$  collides with a stationary body of mass  $3M$  and coalesce to form one body. The speed of the system after collision, is

- A.  $3u$
- B.  $u/3$
- C.  $2u$
- D.  $u/4$

50. A man takes 6 hours 15 minutes in walking a distance and riding back to starting place. He could walk both ways in 8 hours 30 minutes. The time taken by him to ride back both ways is:

- A. 4 hours
- B. 4 hours 30 min
- C. 4 hours 45 min
- D. 5 hours

51. Water forms hydrogen bonds with

- A. Polar solutes
- B. Non-polar solutes
- C. Both A and B
- D. Neither A nor B

52. Pick up the odd man out

- A. Phenylalanine
- B. Tyrosine
- C. Lysine
- D. Tryptophan

53. The enzymes which helps in the formation of double bonds by removal of functional groups, are classified under class:

- A. Lyases
- B. Ligases
- C. Isomerases
- D. Transferases

54. Plasmids that can be propagated in cells of two or more different species are called

- A. Cosmids
- B. Shuttle vectors
- C. Fertility plasmids
- D. Bacteriophage

55. The neuronal Na<sup>+</sup> channel is ..... Ion channel.

- A. Intracellular ligand gated
- B. Extracellular ligand activated
- C. Voltage gated
- D. None of the above

56. An aqueous 0.300 M glucose solution is prepared with a total volume of 0.150 L. The molecular weight of glucose is 180.16 g/mol. What mass of glucose (in gram) is needed for the solution?

- A. 8.11
- B. 14.6
- C. 54
- D. 27

57. If a virus particle contains double stranded DNA with 200,000 base-pairs, how many nucleotides would be present?

- A. 2
- B. 100,000
- C. 200,000
- D. 400,000

58. An organic reaction in which two substituents are eliminated from a molecule in two-step mechanism, is known as

- A. E1 reaction
- B. E2 reaction
- C. SN1 reaction
- D. SN2 reaction

59. Which brain area is primarily involved in motor control?

- A. Cerebrum
- B. Cerebellum
- C. Amygdala
- D. Hippocampus

60. The best molecular technique to isolate different types of neurotransmitters is

- A. Centrifugation
- B. Electrophoresis
- C. PCR
- D. Chromatography

61. Which of the following is not a bone in the middle ear?

- A. Hammer
- B. Anvil
- C. Stirrup
- D. Crowbar

62. Which gas constitutes the second highest percentage in exhaled air?

- A. Nitrogen
- B. Carbon dioxide
- C. Oxygen
- D. Argon

63. Which of the following is not a chemical reaction?

- A. Dissolution of salt in water
- B. Combustion of petrol
- C. Photosynthesis
- D. Polymerization

64. The frequency range of microwaves is between those of
- A. Radio waves and Infrared waves
  - B. Ultraviolet waves and X-Rays
  - C. X-Rays and Gamma rays
  - D. Infrared waves and X-Rays
65. To make their food, plants use chlorophyll, water and light with
- A. Carbon dioxide
  - B. Oxygen
  - C. Nitrogen
  - D. Flourine
66. The gravitational force on moon is
- A. zero
  - B. the same as that on earth
  - C. greater than that on earth
  - D. less than that on earth
67. When you sit in front of a plane mirror, your image is formed
- A. behind the mirror
  - B. in front of the mirror
  - C. on the surface of the mirror
  - D. halfway between you and the mirror
68. In a mirror the image looks left-right flipped but not up-down because
- A. We have stereoscopic vision
  - B. The image in the mirror is virtual
  - C. We do not have stereoscopic vision
  - D. We are bilaterally symmetric
69. Which of the following proteins in the photosynthetic electron transport chain is NOT a transmembrane protein?
- A. ATP synthase
  - B. LHC
  - C. PS II
  - D. Ferredoxin

70. Action potentials are conducted more rapidly in
- A. small diameter axons than large diameter axons
  - B. large diameter axons than small diameter axons
  - C. unmyelinated axons than myelinated axons
  - D. axons that lack a wrapping of Schwann cells
71. Which part of the brain controls eating, drinking, body temperature and provides a link between the brain and the endocrine system?
- A. Amygdala
  - B. Hypothalamus
  - C. Hippocampus
  - D. Parietal lobes
72. \_\_\_\_\_ scan measures brain activity through injecting a radioactive glucose that allows to observe the brain is functioning.
- A. EEG
  - B. TMS
  - C. PET
  - D. CAT
73. Which ERP effect is traditionally linked with expectation violation?
- A. N400
  - B. P300
  - C. LRP
  - D. Both A and B.
74. What does SOA stand for?
- A. Stimulus onset asynchrony
  - B. Stimulus offset asynchrony
  - C. Stimulus on acquisition
  - D. None of the above

75. Who is the father of modern linguistics
- A. Chomsky
  - B. Miller
  - C. Jones
  - D. Matt
76. Which brain area is important for letter identification
- A. Visual word form area
  - B. Frontal lobe
  - C. Cerebellum
  - D. None of the above
77. The school of psychology that emphasizes that the “whole is greater than the sum of its parts” and that emphasizes the tendency to integrate separate stimuli into meaningful patterns is:
- A. Behaviorism
  - B. Gestalt psychology
  - C. Funtionalism
  - D. Structuralism
78. What is the name of the famous book written by William James?
- A. Principles of psychology
  - B. Brain and its nature
  - C. human cognition
  - D. Mind and matter
79. Allan Turing's name is associated with
- A. Artificial intelligence
  - B. Aphasia
  - C. Number theory
  - D. None of the above
80. What is dyslexia?
- A. specific reading disorder
  - B. disease of the eye
  - C. disease of the hands
  - D. One type of neurosis



81. In functional magnetic resonance imaging, what does BOLD stand for?
- A. Blood oxygenated label description
  - B. Blood onset list description
  - C. Blood oxygenated level dependent
  - D. Blood onset level dependent
82. What are the initials of the most famous case study in memory research?
- A. HM
  - B. MT
  - C. CM
  - D. KA
83. Number of lobes in the human brain
- A. 4
  - B. 5
  - C. 6
  - D. 7
84. Paul Broca's name is linked to
- A. Heart disease
  - B. dyslexia
  - C. Aphasia
  - D. None of the above
85. Which of the following is a type of eye movement?
- A. Saccade
  - B. Response
  - C. Both of these
  - D. None of these

86. Capacity limit of verbal working memory is:
- A. 5 to 6 items
  - B. 12-17 items
  - C. 20-30 items
  - D. above 50
87. Whose name is associated with the study of consciousness?
- A. Daniel Dennet
  - B. Noam Chomky
  - C. Both of the above
  - D. None of the above
88. Transformative generative grammar was developed by
- A. Chomsky
  - B. Bhatt
  - C. Miller
  - D. All of the above
89. Cognitive science examines
- A. Mental states
  - B. Brain states
  - C. Computational states
  - D. all of the above
90. TMS stands for
- A. Trans medical system
  - B. Trans mental score
  - C. Transcranial magnetic stimulation
  - D. None of the above

91. Inhibition of return is a phenomenon related to
- A. writing
  - B. attention
  - C. Memory
  - D. perception
92. Main symptom of Wernicke's aphasia is
- A. fluent but meaningless speech
  - B. Visual deficits
  - C. Slow memory
  - D. All of the above
93. qualia is a term related to
- A. consciousness
  - B. attention
  - C. memory
  - D. perception
94. Dichotic listening task is associated with
- A. Selective attention
  - B. Selective memory
  - C. action control
  - D. speech motor control
95. An EEG records
- A. the number of neurons in the brain.
  - B. electrical impulses from the brain.
  - C. chemical activity in the cranial nerves.
  - D. direct electrical stimulation and activation of the brain.

96. Seeing out of the corner of your eye, often important in sports activities and driving, is called

- A. tunnel vision
- B. peripheral vision
- C. Astigmatism.
- D. feature detection.

97. What is speed-accuracy tradeoff?

- A. As speed of response increases, accuracy in performance decreases
- B. As speed of response increases, accuracy in performance increases
- C. As speed of response increases, accuracy in performance remains unchanged
- D. None of the above

98. The visual world paradigm has been used to measure which of the following?

- A. Spoken word recognition
- B. Translation activation in bilinguals
- C. Predictive processing
- D. All of the above

99. In eye movement research, microsaccades refer to:

- A. A small jerky movement
- B. A smooth continuous movement
- C. Movement to an optimal viewing position
- D. A more or less stationary period

100. The words "fan" and "farm" are:

- A. phonological cohorts of each other
- B. semantic competitors of each other
- C. cross-linguistic competitors of each other
- D. phonological rhymes of each other