

GEMI

Examination for the Post of SENIOR SCIENTIFIC ASSISTANT

TYPE

C

[Kindly fill up your seat number carefully]

Seat Number

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[Please read the following carefully before making an attempt to take the Test]

No. of Questions	100
Total Marks allotted	100
Marks for every correct Answer	1
No negative marks will be awarded	For Option "E"
Marks deducted for every wrong Answer or Blank options	0.25
Time limit	120 minutes

Instructions for Candidates

1. Keep only the Hall Ticket, pencil, eraser and Black/Blue ball pen with you. DO NOT keep with you books, rulers, slide rules, drawing instruments, calculators (including watch calculators), pagers, cellular phones, or any other device.
2. Fill up all the details as indicated on top of the QUESTION BOOKLET and OMR Sheet.
3. Fill up correctly your SEAT number both on the QUESTION BOOKLET and OMR Sheet.
4. Read these directions carefully and answer the questions by darkening the appropriate ovals.

All questions are Multiple Choice Questions (MCQs). Each of these questions has four options for answer, out of which only ONE option is correct. A candidate has to select the correct option and fill the corresponding letter in the OMR Sheet against the question.

For Example :

- 1) Ahmedabad is the city of which State?
(A) Maharashtra (B) Tamilnadu
(C) Gujarat (D) Andhra Pradesh



In above example true answer is (C), so the circle of (C) is encoded. Don't write Gujarat in answer.

5. There shall be negative marking for each incorrect answer, 0.25 marks will be deducted from the

candidate's total marks. No negative marks will be awarded, if the option "E" is selected by the candidates. "E" is not option of answer. However, 0.25 will be deducted if all the options are kept blank.

6. Shade the appropriate oval against each question in the OMR sheet. Shade the oval completely and do not shade more than one oval as in that case the answer will be treated null and void and 0.25 marks would be deducted.
7. Use blue/black ball point pen only for writing particulars on this page and writing or marking responses on OMR Sheet/shade the oval.
8. The candidates should ensure that the OMR sheet is not folded or damaged. Do not make any stray marks on the OMR sheet or mutilate the OMR Sheet.
9. Do all rough work on the Question booklet only and NOT on the OMR Sheet. No extra sheet is to be used for the rough work.
10. Ensure that you have signed your name on the attendance sheet circulated by the invigilator. Ensure that the invigilator has signed on the Question Booklet and the OMR Sheet.
11. On completion of the test, the candidate MUST HAND OVER the OMR SHEET to the Invigilator in the room/hall.
12. Strictly follow the instructions of the invigilator. Candidates refusing to comply with the instructions will be expelled from the test.

SEAL

1. How much acidic is pH-2 compared to pH-4 ?
(A) 10 (B) 100
(C) 1000 (D) 10000
2. What is the length of the capillary column which is of diameter 0.2-0.4 mm and recently used in gas chromatography ?
(A) 1 - 5 m (B) 10 - 20 m
(C) 5 - 10 m (D) 20 - 30 m
3. Measured electrical conductivity (EC) value is also used as surrogate measure of which parameter?
(A) pH (B) TDS
(C) Acidity (D) Alkalinity
4. How electrical conductivity is expressed in SI units?
(A) mg/l (B) PPM
(C) MS/m (D) $\mu\text{g}/\text{M}^3$
5. What is usual incubation period for BOD test of the given sample as per standard method?
(A) 1 day 30°C
(B) 3 day 30°C
(C) 5 day 30°C ✓
(D) 5 day 20°C
6. What is toxicity in the context of fish biology?
(A) The ability of fish to tolerate extreme temperatures
(B) The degree to which fish are attracted to toxic substances
(C) The harmful effects of chemicals or pollutants on fish health
(D) The natural resistance of fish to diseases
7. What does it mean if the "NOEC" (No Observed Effect Concentration) is determined to be 10 mg/L for a particular chemical?
(A) No fish were exposed to the chemical during the study.
(B) At a concentration of 10 mg/L, no adverse effects on fish were observed.
(C) Fish exhibited adverse effects at all tested concentrations.
(D) The concentration was too high for accurate testing.
8. Which of the following is NOT a commonly used measure of toxicity factor in fish toxicology?
(A) LC50 (Lethal Concentration for 50% mortality)
(B) LD50 (Lethal Dose for 50% mortality) ✓
(C) EC10 (Effective Concentration for 10% response)
(D) pH level of the water
9. What is the unit of measurement for LD₅₀?
(A) mg/L (B) mg/kg bw
(C) ppm (D) $\mu\text{g}/\text{m}^3$

10. Which method is commonly used in fish bioassays to determine the concentration at which a toxic substance causes a specific effect in 50% of the test population?
(A) DNA sequencing (B) Microscopy
(C) Dose-response curve analysis (D) Algal bloom assessment
11. Which sterilization method is most commonly used for heat-sensitive materials?
(A) Autoclaving (B) Incineration
(C) Filtration (D) Dry heat sterilization
12. What is the primary mode of action of ultraviolet (UV) irradiation for sterilization?
(A) Denaturation of proteins and nucleic acids (B) Disruption of cell membranes
(C) Oxidation of cellular components (D) Heat generation
13. What is the purpose of the multiple-tube fermentation technique in the MPN test?
(A) To count individual coliform colonies
(B) To isolate coliform bacteria
(C) To confirm the presence of coliforms
(D) To estimate the coliform concentration
14. Which of the following is NOT typically used as a selective medium in the MPN test for coliform bacteria?
(A) MacConkey agar (B) Brilliant Green Lactose Bile Broth
(C) Eosin Methylene Blue agar (D) Nutrient agar
15. How are coliform colonies typically identified on the membrane filter after incubation?
(A) By their color (B) By their shape
(C) By their size (D) By Gram staining
16. Powers and function of central and state boards are discussed in which chapter of water (Prevention and control of pollution) Act, 1974.
(A) Chapter - 2
(B) Chapter - 3
(C) Chapter - 4
(D) Chapter - 5
17. As per Air (Prevention and control of pollution) Act, 1981 board shall meet at least
(A) Once in every three months
(B) Once in every 1 year
(C) Once in every 2 years
(D) Once in every 3 years
18. How many persons are to be nominated by state government to represent the companies or corporations owned by government.
(A) One (B) Two
(C) Three (D) Five

19. As per the environmental (Protection) Act, 1986, penalty for contravention of rules, orders and direction may be imprisonment of a term, which may extend to.
- (A) 1 year (B) 2 years with fine
(C) 5 years with fine (D) 10 years with fine
20. What is true as per the National Environment Policy 2006 objectives ?
- (A) Conservation of critical environment resources
(B) Secretary for the poor and assured secure access to resources
(C) Integrate environmental concerns for economic and social development
(D) All of the above are correct
21. If the cost price of 10 pencils is equal to the selling price of 8 pencils, find the gain percent?
- (A) 15% (B) 20%
(C) 25% (D) 30%
22. A square garden is surrounded by a 2 m wide path. If the area of the path is 224m^2 , find the area of the garden.
- (A) 625m^2 (B) 679m^2
(C) 729m^2 (D) 784m^2
23. What must be added to each term in the ratio 2 : 3, so that it may become equal to 4 : 5 ?
- (A) 8 (B) 4
(C) 6 (D) 2
24. 'A' works twice as faster than 'B'. If 'A' and 'B' can together complete the work in 4 hours, find the time taken by 'A' alone to complete the work?
- (A) 6 hours (B) 7 hours
(C) 8 hours (D) 9 hours
25. The volume of the water tank 'A' and 'B' is in the ratio 4 : 5. If the volume of water in the tank 'A' is increased by 30%, by what percentage the volume in tank 'B' must be increased so that both the tanks have same volume of water?
- (A) 4% (B) 5%
(C) 6% (D) 7%
26. World famous Modhera Sun temple is situated on the bank of the river ?
- (A) Mahishmati (B) Rupmati
(C) Pushpavati (D) None of these
27. Dinosaur fossil Park and museum located in _____, Gujarat ?
- (A) Vyara (B) Balasinor
(C) Morbi (D) Velavadar
28. Shanti Swarup Bhatnagar awards are given in the field of _____.
- (A) Science and Technology (B) Literature
(C) Peace (D) Sports

29. What is the maximum speed of Brahmos Missile ?
 (A) Mach 1 (B) Mach 2
 (C) Mach 3 (D) Mach 4
30. What is the name of India's first solar village ?
 (A) Dholera (B) Modhera
 (C) Punsari (D) Dhanora
31. Match the following
- | Application form | Area of Accreditation |
|------------------|---------------------------------|
| i) NABL-151 | a) For calibration Laboratories |
| ii) NABL-152 | b) For testing laboratories |
| iii) NABL-153 | c) For proficiency laboratories |
| iv) NABL-180 | d) For medical laboratories |
- (A) i (b), ii(c), iii (d), iv (a) (B) i (a), ii(b), iii (c), iv (d)
 (C) i (c), ii(d), iii (a), iv (b) (D) i (d), ii(a), iii (b), iv (c)
32. Conformity Assessment Body (CAB) has to take necessary corrective action on non-conformities and submit a report to NABL secretariat within.
 (A) 15 days (B) 30 days
 (C) 45 days (D) 60 days
33. All decisions taken by NABL are open to appeal by Conformity Assessment Body (CAB). The appeal is to be addressed to
 (A) Chairman, NABL (B) M.D., NABL
 (C) Secretary, NABL (D) C.E.O., NABL
34. NABL has published a guide document for process and procedure.
 (A) Document NABL 100 B
 (B) Document NABL 101 B
 (C) Document NABL 102 B
 (D) Document NABL 103 B
35. Match the followings
- | | |
|----------------------------------|--------------------------|
| i) Reference material producer | a) As per ISO/IEC 17025 |
| ii) Calibration laboratories | b) As per ISO/ IEC 17043 |
| iii) Medical Lab. | c) As per ISO /IEC 17034 |
| iv) Proficiency testing provider | d) As per ISO 15189 |
- (A) i (b), ii(c), iii (d), iv (a) (B) i (c), ii(d), iii (a), iv (b)
 (C) i (d), ii(a), iii (b), iv (c) (D) i (a), ii(b), iii (c), iv (d)
36. NABL secretariat is functioning from _____
 (A) Gurugram (B) New Delhi
 (C) Nagpur (D) Bhopal

37. NABL Accreditation is valid for a period of _____.
 (A) 1 year (B) 2 years
 (C) 3 years (D) 4 years
38. NABL shall conduct periodic surveillance of Conformity Assessment Bodies (CAB) on _____.
 (A) Quarterly basis (B) Half yearly basis
 (C) Yearly basis (D) Two yearly basis
39. CAB shall apply for renewal of accreditation to NABL at least _____.
 (A) One month before expiry (B) Two months before expiry
 (C) Four months before expiry (D) Six months before expiry
40. Applicant laboratories are required to successfully participate in _____.
 (A) at least one proficiency testing programme before grant of accreditation.
 (B) at least two proficiency testing programme before grant of accreditation.
 (C) at least three proficiency testing programme before grant of accreditation
 (D) at least four proficiency testing programme before grant of accreditation.
41. Peroxyacetyl Nitrate (PAN) is formed by oxidation of
 (i) Aldehydes (ii) Ketones
 (iii) Non-methyl Volatile Organic Carbon (iv) Mercury, Arsenic and Lead
- Choose the correct answer from the codes:
 Codes:
 (A) (i) and (iv) (B) (ii) and (iv)
 (C) (i), (ii), (iii) and (iv) (D) (i), (ii) and (iii)
42. Fugitive emissions consist of _____.
 (A) Street dust (B) Dust from construction activities
 (C) Dust from farm cultivation (D) All of the above
43. Ozone if present in _____ acts as a pollutant.
 (A) Troposphere (B) Stratosphere
 (C) Mesosphere (D) Exosphere
44. Which of the following gases facilitates formation of tropospheric ozone?
 (A) NO₂ (B) SO₂
 (C) CO (D) NH₃
45. Lead pollution in air is caused mainly by _____.
 (A) Automobiles (B) Agricultural activities
 (C) Mining activities (D) Forest Fires
46. Which of the following rivers is having world's tallest railway bridge over it?
 (A) Ganga River (B) Brahmaputra River
 (C) Chenab River (D) Godavari River

47. Which Indian cricketer became the fastest to reach 13,000 runs in One Day Internationals?
(A) Virat Kohli (B) Sachin Tendulkar
(C) Rohit Sharma (D) MS Dhoni
48. What is the common source of nitrogen oxides (NO_x) in urban air pollution?
(A) Industrial emissions (B) Volcanic eruptions
(C) Natural forest fires (D) Automobile exhaust
49. Which Indian state recently launched the "One Family, One Job" scheme to provide government jobs to one member of each family?
(A) West Bengal (B) Assam
(C) Manipur (D) Sikkim
50. What is the name of India's first indigenous aircraft carrier, which was commissioned into the Indian Navy in 2021?
(A) INS Vikramaditya (B) INS Vikrant
(C) INS Viraat (D) INS Kolkata
51. Which part of the Indian Constitution deals with the Fundamental Rights of citizens?
(A) Part I (B) Part II
(C) Part III (D) Part IV
52. Which Indian scientist played a crucial role in the development of the COVID-19 vaccine known as "Covaxin"?
(A) Raghuram Rajan (B) Dr. K. Radhakrishnan
(C) Dr. Krishna Ella (D) Dr. A.P.J Abdul Kalam
53. What is the name of India's first indigenous anti-satellite missile system, which was successfully tested in 2019?
(A) Agni-V (B) Prithvi-II
(C) Mission Shakti (D) Nag Missile
54. Which of the following articles of the Indian Constitution deals with the Fundamental duties of every citizen to protect and improve the natural environment?
(A) Article 51 (B) Article 19
(C) Article 21 (D) Article 24
55. Who is the first Indian to win a Nobel Prize in Physics?
(A) C. V. Raman (B) Homi Bhabha
(C) Satyendra Nath Bose (D) Meghnad Saha
56. Which is correct method to preserve wastewater sample for analysis of NH₃-N?
(A) Refrigerate the sample at 4°C
(B) Add 2 ml NaOH (5N)/L of sample and refrigerate at 4°C
(C) Add 2 ml 40% H₂SO₄ to bring pH<2, refrigerate at 4°C
(D) Add 2 ml 2N Zinc acetate/100 ml of sample

57. Which is correct method to preserve wastewater sample for analysis of fluoride, and what is the maximum holding period?
 (A) Preservation not required, 7 days
 (B) Refrigerate the sample at 4°C, 6 months
 (C) Preservation not required, 6 months
 (D) Add 40 mg HgCl₂, 7 days
58. Bromocresol blue as an indicator shows sharper color change at pH
 (A) 3.7 (B) 7.0
 (C) 8.2 (D) 9.1
59. For estimation of alkalinity of a sample, the interference of residual chlorine can be removed by adding of a small amount (one/two drop) of _____ solution.
 (A) 0.1N Sodium hydroxide (B) 0.1 mol/L Sodium thiosulfate
 (C) 0.1N Sodium carbonate (D) 0.1 ml/L Mercuric sulfate
60. In a conventional 5-day BOD test, we measure only the _____.
 (A) CBOD (B) NBOD
 (C) TBOD (D) CBOD + NBOD
61. In wastewater analysis, conductive is customarily reported in _____.
 (A) Microohms (B) Micromhos
 (C) Microohms per centimeter (D) Micromhos per centimeter
62. Apparent colour of wastewater caused by _____.
 (A) organic solvents (B) inorganic solvents
 (C) suspended matter (D) dissolved matter
63. 1 mg/L of Pt (K₂Pt Cl₆) gives standard _____ unit of colour.
 (A) 0.1 (B) 1.0
 (C) 10.0 (D) 100.0
64. COD results are not accurate if the sample contains more than
 (A) 100 mg/L chlorides (B) 1000 mg/L chlorides
 (C) 100 mg/L sulphides (D) 1000 mg/L sulphides
65. _____ must be present in COD analysis.
 (A) Excess of K₂Cr₂O₇ (B) Equilibrium of K₂Cr₂O₇
 (C) Excess of [Fe(NH₄)₂(SO₄)₂] (D) Equilibrium of [Fe(NH₄)₂(SO₄)₂]
66. In COD analysis, addition of _____ to conc. H₂SO₄ acts as a catalyst
 (A) Ag₂SO₄ (B) AgCl
 (C) HgSO₄ (D) HgCl₂
67. In COD analysis, _____ used as indicator.
 (A) Mercury sulphate (B) Ferroin
 (C) Ferrous sulphate (D) Ferrous ammonium sulphate

68. In fresh water at 25°C, DO value is _____ mg/L
 (A) 8.1 (B) 8.3
 (C) 8.5 (D) 8.7
69. DO requirement for healthy fish population in water is in range of _____ mg/L
 (A) 5 to 8 (B) 4 to 8
 (C) 3 to 8 (D) 2 to 8
70. In estimation of DO, nitrite interference is overcome by use of _____.
 (A) NaN_3 (B) $\text{Na}_2\text{S}_2\text{O}_3$
 (C) MnSO_4 (D) HgSO_4
71. Under acidic conditions fluorides react with zirconium - SPANDS solution and colour changes to _____.
 (A) red (B) blue
 (C) pale yellow (D) colourless
72. Hardness in water is caused by the presence of _____.
 (A) monovalent metallic anions
 (B) multivalent metallic anions
 (C) multivalent metallic cations
 (D) monovalent metallic cations
73. In estimation of TKN, the liberated ammonia is absorbed in _____.
 (A) barium sulphate (B) boric acid
 (C) cupric sulphate (D) potassium sulphate
74. In $\text{NH}_3\text{-N}$ determination, ammonia produces a _____ coloured compound when reacted with alkaline Nessler reagent
 (A) White (B) Pink
 (C) Bluish green (D) Yellowish brown
75. If oil and grease of wastewater sample is between 5 to 15 mg/L, which method is to be used for its estimation?
 (A) Soxhlet extraction
 (B) Liquid-liquid extraction
 (C) Double distillation
 (D) Reflux distillation
76. Which of the following statements is incorrect from point of view of calibration of spectrophotometer?
 (A) Calibration process should have series of standards
 (B) Calibration process should have specified wavelength
 (C) Calibration curve should be essentially a straight line
 (D) Once calibrated need not to be calibrated again life time

77. "Intensity of ray of monochromatic light decreases exponentially as the concentration of absorbing medium increases" is said under the law called
(A) Beer's law (B) Lambert's law
(C) Ohm's law (D) Boyle's law
78. Flame photometry is generally not used in water analysis for determining
(A) Acidity (B) Sodium
(C) Potassium (D) Calcium
79. Which device is responsible to separate various wavelengths from emitted radiation in flame photometer?
(A) Photocell (B) Prism
(C) Flame (D) Amplifier
80. Addition of graphite furnace in new atomic absorption spectrophotometer allows determination of
(A) Zinc (B) Magnesium
(C) Nitrogen (D) Heavy metals
81. Which of the following is not an element of Gas chromatograph?
(A) Sample injection port (B) Column
(C) Electrode (D) Detector
82. Which among the following gases is mostly used as carrier gas in gas chromatograph?
(A) Carbon dioxide (B) Helium
(C) Carbon monoxide (D) Oxygen
83. Which detector of gas chromatograph responds well to most gases and useful for analysis of gases resulting from anaerobic digestion ?
(A) Electron capture detector (B) Flame ionization detector
(C) Thermal conductivity detector (D) Colorimetric detector
84. pH data is generally interpreted in terms of
(A) Hydrogen ion concentration
(B) Calcium ion concentration
(C) Sodium ion concentration
(D) Magnesium ion concentration
85. In a given sample of solution pH is a measure of
(A) Concentration of solution (B) Density of solution
(C) Ion activity in solution (D) Specific gravity of solution
86. The major anthropogenic source of SO_2 in atmosphere is _____
(A) Combustion of fuel (B) Volcanic eruption
(C) Vehicular emission (D) Anaerobic decomposition

87. SO_2 in ambient air monitoring is estimated by _____
 (A) West and Gaeke method (B) Jacob & Hochheiser method
 (C) ASS / ICP method (D) Gravimetric method
88. In National Ambient Air Quality Standard, time weighted average of 8 hours and 1 hour is given for _____ and _____.
 (A) SO_2 , NO_2 (B) SO_2 , PM_{10}
 (C) $\text{PM}_{2.5}$, CO (D) Ozone and CO
89. Which of the following statements is INCORRECT about Ambient Air Monitoring?
 (A) The data collected provide information on air quality trend in an area.
 (B) The data gives the direct concentration of the pollutants being emitted from the industries.
 (C) The ambient air sample is collected along with the meteorological data of that particular location.
 (D) Ambient Air Monitoring is helpful in assessing the extent of pollution.
90. Which of the following instruments is used to measure the Total Suspended Particulate Matter?
 (A) High Volume Sampler
 (B) Respirable Dust Sampler
 (C) Fine Particulate Sampler
 (D) Ultra-fine Particulate Sampler
91. From the environmental point of view which of the following is the most important carbonated mineral in soil?
 (A) Dolomite (B) Magnesium carbonate
 (C) Siderite (D) Calcite
92. Which soil horizon is present in the soil of forests but absent in deserts and cultivated field?
 (A) O horizon
 (B) A horizon
 (C) B horizon
 (D) C horizon
93. Which is the main available form of sulphur that is reduced by autotrophs and incorporated into proteins?
 (A) S_8 (B) S_4
 (C) SO_4 (D) SO_2
94. Acidic nature of soil is shown by high concentration of _____.
 (A) Phosphorus (B) Oxygen
 (C) Nitrogen (D) Hydrogen
95. Lithophiles are tends to be associated with
 (A) minerals
 (B) iron
 (C) gaseous components of the atmosphere
 (D) oxide ions

96. Montreal protocol aims at:
- (A) Reduction in emissions of greenhouse gases
 - (B) Phasing out ozone depleting substances
 - (C) Prohibiting transboundary movement of hazardous waste
 - (D) Enhancing cooperation among UN member states for peaceful uses of nuclear energy
97. Which greenhouse gas is added in atmosphere due to cattle farming and landfill waste dumping?
- (A) Nitrous oxide
 - (B) Water vapour
 - (C) Methane
 - (D) Carbon Dioxide
98. Which of the following is INCORRECT regarding Oil Spill?
- (A) Oil Spill only causes economical loss, it does not have any effect on environment.
 - (B) Oil Spill reduces the level of dissolved oxygen in water.
 - (C) Due to oil spill marine mammals and birds may die from hypothermia as the insulating and waterproofing properties of feathers and fur is affected.
 - (D) Oil Spills can be removed through skimming or use of various sorbents.
99. Compared to CO₂, methane has global warming potential of
- (A) 5 - 10 times more
 - (B) 20 - 25 times more
 - (C) 40 - 45 times more
 - (D) 60 - 65 times more
100. Which of the following statements is CORRECT related to Acid Rain?
- (A) Acid rain increases the fertility of soil by adding NO_x and SO_x directly into the soil
 - (B) Acid rain is only in the form of wet deposition.
 - (C) Acid rain affects the aquatic organisms by making the water acidic and also by interrupting the food chain in it.
 - (D) Marble surface does not corrode when exposed to Acid Rain.

