

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2010.

Ph.D. (ECOLOGY AND ENVIRONMENTAL SCIENCES)

COURSE CODE : 111

Register Number :



Signature of the Invigilator
(with date)

COURSE CODE : 111

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 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. Article 48A of the Indian Constitution deals with
 - (A) Fundamental duties of Indian citizens
 - (B) Fundamental rights of Indian citizens
 - (C) Directive principle to the Governments regarding Environment
 - (D) Directive principle to the Governments as low slaughter

2. Which is the most abundant gas in the atmosphere?

(A) Hydrogen	(B) Ammonia
(C) Carbon-di-oxide	(D) Nitrogen

3. Extinction is the

(A) Total loss of a species	(B) Loss of a species in the wild
(C) Loss of local population of the species	(D) Loss of species by taxonomy

4. A pollutant at low concentration stimulates the growth of a plant but is lethal at higher concentration. We propose a model $dN/dt = r(C)N$ where r is the growth rate which is a function of the pollutant concentration C . $r(C)$ can be

(A) Linear function of C	(B) a non-linear function of C
(C) a sinusoidal function of C	(D) none of the above

5. The term Niche refers to

(A) Living space of the organisms	(B) Living space of people
(C) Profession only	(D) None of above

6. Air pollutants injure plants in proportion to

(A) their diffusibilities in air	(B) their settling velocities from air
(C) their suspension in water	(D) their solubility in water

7. Dichloro-diphenyl-trichloroethane is a

(A) organochlorine insecticide	(B) inorganic chloride insecticide
(C) methyl isocyanate	(D) benzene insecticide

8. Litter decomposition is carried out by
- (A) Molluscs, star tortoise & Plants
 - (B) Bacteria, fungi, arthropods & earthworms
 - (C) Butterflies & birds
 - (D) Earthworm, fishes and parasites
9. If an exotic shrub is to be introduced as a source of fuel wood, which of the following arguments should receive the utmost consideration?
- (A) Only the indigenous species should be encouraged
 - (B) Exotics are delicate species requiring good deal of care
 - (C) A shrub may not yield sufficient quantity of fuel wood
 - (D) The exotic may become a pest
10. Half life of a radionuclide data measures
- (A) The intensity of the activity
 - (B) The time it takes for the nuclide to become stable and harmless
 - (C) The time for reduction of activity by a factor of 2
 - (D) The life-time dose of radioactivity
11. Two interacting populations obey the model equalitions $dx/dt = ax + bx - cxy$; $dy/dt = dy - exy$, where a,b,c,d and e are positive constants. The populations are
- (A) commensal species
 - (B) competing species
 - (C) predator and prey
 - (D) none of the above
12. Macroclimate is controlled by _____ while a microclimate is controlled by land surface and by _____.
- (A) latitude, vegetation
 - (B) longitude, altitude
 - (C) rainfall, cloud cover
 - (D) temperature, light
13. Best early indication of desertification would be in terms of :
- (A) Increased run-off of water
 - (B) Invasion of Sand-dunes
 - (C) Increase in human and cattle population
 - (D) Fall in primary productivity

14. Energy sector accounts for _____ of global CO₂ emissions
(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{4}$
15. The world's largest flower is
(A) *Amorphophallus titanum* (B) *Helianthus annuus*
(C) *Tridax* (D) *Cucurbita pepo*
16. No. of Species at equilibrium increase with increase in area habitat. This statement is:
(A) False (B) True (C) Same (D) None
17. What is pangea?
(A) Land in South America
(B) Single piece of land with all 7 continents
(C) Land in South Africa
(D) An animal
18. One of the following combinations lists out current environmental issues
(A) Ozone depletion, respiration and photosynthesis
(B) Deforestation, transpiration, hibernation
(C) Deforestation, biodiversity loss, ozone depletion and population increase
(D) Sea level rising, pollination, nutrient cycling
19. In situ conservation is advantageous because
(A) It provides ecosystem-level natural interaction of biota
(B) It is coast effective
(C) It is harmless
(D) It offers ecosystem services
20. The Tsunami episode of December 2004 had its
(A) Epicenter in Sumatra and affected south, southeast Asian and Somalia coasts
(B) Epicenter in Sri Lanka and affected America
(C) Epicenter in India and affected Arctic region
(D) Epicenter in Somalia and affected Australia

21. Macro and micronutrients include
- (A) N, P, Cu, Zn and K, Zn, Fe, Mg
 - (B) N, P, K, Ca, Mg and Cu, Fe, Mn, Zn
 - (C) Cu, Fe, Mn, Zn and N, P, K, Ca, Mg
 - (D) None of the above
22. One of the following represents an order
- (A) Consumer, decomposer, producers and cycling
 - (B) Decomposer, producer, recycling and consumers
 - (C) Producers, consumers, decomposer and recycling
 - (D) Producer, recycling, decomposers and consumers
23. The Increase in concentration of persistent molecules as they move through a food chain is called
- (A) Biomolecular fixation
 - (B) Biogeochemical fixation
 - (C) Biological Magnification
 - (D) Heterotrophic Magnification
24. Sacred groves are
- (A) Natural forests protected on local religious belief
 - (B) Reserve forest
 - (C) National parks
 - (D) Monoculture forests
25. The natural fall of leaves from their branches is due to the formation of
- (A) Tannic acid
 - (B) Antipodals
 - (C) Abscission layers
 - (D) Oxalic acid
26. When DDT was applied in an orchard as a pesticide the fruit production decreased. This happened because
- (A) DDT is a growth retardant
 - (B) DDT killed the pollinating insects along with the pests
 - (C) DDT disturbed normal hormone balance essential for fruit setting
 - (D) None of the above
27. 96% of the body of an organism contains
- (A) O, C, H & N
 - (B) O, P, Cl, H
 - (C) Na, Cl, O, H
 - (D) N, O, Na, Cl.

28. Monoatomic Cl are formed in
 (A) Lithosphere (B) Stratosphere (C) Hydrosphere (D) Geosphere
29. Low ecological amplitude means
 (A) Not Vulnerable to extinction (B) Low inheritance
 (C) Vulnerable to extinction (D) High inheritance
30. Mineral waters have acidity due to
 (A) free CO₂ (B) Bound O₂ (C) Free NaCl. (D) BOD
31. Acidification in soil is due to
 (A) Decrease in soil calcium (B) Increase in soil calcium
 (C) Decrease in soil Nitrogen (D) Increase in soil Nitrogen
32. COD in water is determined
 (A) To detect organic load of water (B) To detect inorganic load of water
 (C) To detect chemicals (D) None of the above
33. An example for bioluminescence is
 (A) Photostomias (B) Photophobias
 (C) Photochemone (D) Photopicher
34. What is a grab sample?
 (A) Water collected from surface level at a site
 (B) Benthic waters of the site
 (C) waters collected from different depths at a site
 (D) waters collected from lake
35. Bio-indicators of air pollution
 (A) Air-samplers (B) Labio-rohita (C) Lichens (D) Earthworms
36. Organizations concerned with environmental protection and conservation
 (A) IUCN, UNEP, CITES, BGCI (B) BBC, UGC, DST, IIT
 (C) CSIR, ICAR, ICMR, IARI (D) AIU, UNESCO, AICTE, TIFR

37. Sources of rubber include
- (A) *Ficus, Morus & Artrocarpus* (B) *Mimusops, Ruta & Euphorbia*
 (C) *Calotropis, Plumeria & Melia* (D) *Ficus, Hevea & Manihot*
38. Moth pollination is characterized by
- (A) night blooming, scented, white, tubular flowers
 (B) day blooming, red, rotate flowers
 (C) noon blooming white flowers
 (D) day blooming yellow flowers
39. The most diverse ecosystems in the world are:
- (A) Tropical Savannahs (B) Tropical Rain Forests
 (C) Coral reefs (D) The deep sea floor
40. Genetic variation increases due to:
- (A) Mutation (B) Recombination
 (C) Duplication (D) All of the above
41. Acid precipitation kills fish by the release of
- (A) aluminum ions (B) carbon monoxide
 (C) anticoagulant (D) mercury
42. Ozone depletion gets initiated due to
- (A) Diatomic Cl (B) Hydrocarbons
 (C) Monoatomic Cl (D) Monoflourides
43. Which of the following aquatic ecosystems has the lowest primary productivity?
- (A) Lake (B) Estuary (C) River (D) March
44. Which one the following is a pesticide?
- (A) Parathion (B) Lindane (C) Monocrotohos (D) all of them
45. National Biodiversity Authority (NBA) is set up at
- (A) New Delhi (B) Bangalore (C) Chennai (D) Trivandrum

46. Ecological planning and design of natural environment is directed to:
- (A) Maximize positive effects of landscape resources.
 - (B) Provide greater natural opportunities of development
 - (C) Minimize negative effects on ecological problems.
 - (D) All of the above
47. Arsenic is very much prevalent in ground water of:
- (A) Some part of Madhya Pradesh
 - (B) Some part of Andhra Pradesh
 - (C) Some part of West Bengal
 - (D) Some parts of Tamil Nadu
48. The major nutrient of concern in freshwater is:
- (A) Nitrogen
 - (B) Calcium
 - (C) Phosphorus
 - (D) Chlorides
49. Which part of solar radiation is used to heat in a solar cooker?
- (A) Gamma radiation
 - (B) Infra – red radiation
 - (C) u-v radiationis
 - (D) y-Radiation
50. Lathyrism is a disease caused by
- (A) Black dal
 - (B) Kesari dal
 - (C) Deficiency of iodine
 - (D) Excess of vitamins
51. Aflatoxins are released by
- (A) *Culex*
 - (B) *Aspergillus*
 - (C) *Entamoeba*
 - (D) Housefly
52. The maximum forest cover is in
- (A) Assam
 - (B) Madhya Pradesh
 - (C) Uttar Pradesh
 - (D) Maharashtra
53. Species most vulnerable to extinction due to human activities are those with
- (A) Low ecological amplitude
 - (B) High population growth rates
 - (C) Large niches
 - (D) Many natural predators
54. Important defences of plants against herbivores are
- (A) Dry seeds
 - (B) Fleshy fruits
 - (C) Proteins
 - (D) Secondary metabolites

55. Heat is a
 (A) Non-degradable pollutant (B) Bio-degradable pollutant
 (C) Conservative pollutant (D) None of the above
56. Name the type of radiation that is absorbed by CO₂ molecules in the atmosphere.
 (A) Gamma radiation (B) X-rays
 (C) β - radiation (D) Infra radiation
57. Available fresh water constitutes
 (A) 1% of all world water constitutes
 (B) much less than 1% of all world water resources
 (C) 2% of all world water resources
 (D) 5% of all world water resources
58. A quadratic equation of the form $y = ax - bx^2$ if a and b are positive real numbers, has in the interval $[0, \infty]$
 (A) One zero (B) three zeros (C) two zeros (D) four zeros
59. Fleming obtained penicillin from
 (A) *Penicillium notatum* (B) *Penicillium chrysogenum*
 (C) *Penicillium caprieum* (D) *Blue green algae*
60. Which one of the following vitamin is called antihemorrhagic vitamin?
 (A) Vitamin C (B) Vitamin D (C) Vitamin K (D) Vitamin A
61. The mean and variance of a Binomial distribution are 4 & 3 Then the value of mode is
 (A) 3 (B) 4.25 (C) 4 (D) 5
62. Any land which is not producing green biomass consistent with the status of soil and water is designated as
 (A) Fallow land (B) Uncultivated land
 (C) Wasteland (D) Arable land
63. The amount of chemical material cycling through biosphere
 (A) goes down with time (B) fluctuates with seasons
 (C) remains constant (D) increases with time

64. Sewage causes eutrophication because it contains
 (A) heavy metals (B) no oxygen (C) nutrients (D) bacteria
65. Abiotic Component of the Ecosphere is:
 (A) Soil (B) Saprophytes (C) Autotrophs (D) Heterotrophs
66. What proportion of solar energy that enters the earth's atmosphere is converted to chemical energy by plants?
 (A) 5% (B) >20%
 (C) <2% (D) None of the above
67. Which is the largest wetland in India?
 (A) Dal lake (B) Chuka lake
 (C) Ooty lake (D) Vembanad lake.
68. A Landscape with constantly decreasing productivity indicates
 (A) Erosion by rain (B) Desertification
 (C) Eutrophication (D) Pollution of ground water
69. Water has maximum density at _____°C
 (A) 10 (B) 5 (C) 4 (D) 15
70. Name the anti-knock agent in motor fuels
 (A) Gasohol (B) Tetra ethyl lead (C) Trimethyl acid (D) Acetone
71. Which of the following is not an element of conservation?
 (A) Principal target (B) Time scale of concern
 (C) Management (D) CAMP
72. Entropy is a measure of
 (A) The number of trophic levels in a system
 (B) The status of a single trophic level in a system
 (C) The order in a system
 (D) None of the above in a system

73. CSD stands for
(A) Common Scientific Development
(B) Commission for Space Development
(C) Commission for Sustainable Development
(D) Commission for Suitable Development
74. Green House Gases are so called because
(A) They are coloured green
(B) They absorb infrared radiation
(C) They occur in green houses
(D) They are associated with potted plants
75. Thermoregulatory centre in a human body is
(A) Skin (B) Diencephalon (C) Pituitary (D) Adrenal
76. Species richness refers to
(A) Total no. of reptiles in a park (B) Total no. of species in an area
(C) Species interactions (D) Parasitic species
77. Anadromus fishes
(A) breed in salt water but spend most of their life in freshwater
(B) breed in freshwater but spend most of their lives in salt water
(C) breed in river water but spend most of their lives in lakes
(D) breed in warm water currents of the ocean
78. Which of the following is not a component of population phenotype?
(A) Morphology (B) Physiology
(C) Behavior (D) Habitat quality
79. In a pure dry air what is the % of O₂ content?
(A) 20% (B) 21% (C) 25% (D) 30%
80. The common name of *Celosia argentea* is
(A) The White cock's comb (B) The Thorny Amaranth
(C) Prickly - Chaff flower (D) Javanese wool plant

81. Nanoplankton
(A) the largest plankton (B) zooplankton
(C) phytoplankton (D) the smallest plankton
82. Oil shale is
(A) a fine grained sedimentary rock (B) a rough grained sedimentary rock
(C) sand particles with oil (D) none of the above
83. Geothermal energy is
(A) harnessing lithosphere heat (B) harnessing earth's internal heat
(C) harnessing earth's surface heat (D) none of these
84. Species extinction over the past few centuries was higher in:
(A) Islands than in continents
(B) Plants rather than animals
(C) Marine rather than terrestrial ecosystems
(D) None of the above
85. "Complexity in ecosystem need not necessarily lead its stability". This statement is
(A) Correct
(B) Not Correct
(C) Cannot say without further input
(D) Such general statements should never be made
86. A prey-predator system generally shows limit-cycle behaviour because
(A) Predators and Prey do not like each other
(B) Prey benefit Predators but not the other way
(C) Time-lags inherent in interactions
(D) Cannot say without further information
87. The fraction of incident Solar energy fixed by plants is
(A) 5% (B) 10% (C) 1% (D) 25%

88. Second Law of Thermodynamics relates to
- (A) Conversion of energy
 - (B) Production of energy
 - (C) Production of pollutants
 - (D) Fixation of solar energy by solar cells
89. C3 and C4 are
- (A) Isotopes of Carbon
 - (B) Number of co-ordinate bonds of Carbon in methane
 - (C) Pathways in photosynthesis
 - (D) None of the above
90. Canopy species in a forest ecosystem are most likely to be the
- (A) Most efficient users of energy
 - (B) Most efficient in photosynthetic fixation
 - (C) First colonisers of the locality
 - (D) Most efficient competitors for sunlight
91. Character displacement is best described as
- (A) Change of behaviour induced by scarcity
 - (B) Change in morphological features
 - (C) Changes induced by influence of selfishness in genes
 - (D) Changes induced by influence of predators
92. Dispersal in animals is most likely to be
- (A) An attempt by the organism to avoid in-breeding
 - (B) An attempt by the organism to find better feeding ground
 - (C) An attempt by the organism to do both of the above
 - (D) A behaviour unrelated to any of the above
93. "Language development is unrelated to the study of Ecology"
- (A) The above statement is true as it is part of an entirely different discipline
 - (B) The statement is true because no ecologists wastes his time on this
 - (C) The statement is false because some ecologists do it because they have nothing else to do
 - (D) The statement is false because language has intrinsic role in species survival

94. The Lotka-Volterra model of competition suggests
- (A) Competing species are unlikely to coexist
 - (B) Competing species will coexist
 - (C) Competing Species have no effect on one another
 - (D) Competition is entirely artificial construct and has no real relevance
95. The *t*-test is used to test
- (A) If the two data sets have different variances
 - (B) If the two data sets have different means
 - (C) If the two data sets have different skewness
 - (D) If the two data sets have come from the same population
96. Standard Normal distribution is
- (A) bimodal and asymmetric
 - (B) uniform in (-1,1)
 - (C) discontinuous in (-1,1)
 - (D) symmetric about the mean
97. The probability of getting 5 heads in tossing a fair coin 10 times is nearly
- (A) 0.1
 - (B) 0.5
 - (C) 0.25
 - (D) 0.75
98. The term WSSD refers to
- (A) World Society for Science in Development
 - (B) Water for Sustainable and Safe Drinking
 - (C) World Summit for Sustainable Development
 - (D) World Summit for Social Development
99. A drunkard unable to discern the directions would cover in N steps a distance that varies as
- (A) square root of N
 - (B) cube root of N
 - (C) square of N
 - (D) N
100. Ethology deals with
- (A) reproduction
 - (B) growth
 - (C) behaviour
 - (D) death