ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

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. When a forest gets fragmented into small pieces, the
   (A) Species area relationship decreases
   (B) Species area relationship increases
   (C) The ratio of interior to edge increases
   (D) The ratio of interior to edge decreases

2. Cell organelle that aids in photorespiration
   (A) Peroxysomes (B) Mitochondria
   (C) Golgi bodies (D) None

3. The standard form of the normal distribution is given by
   (A) $Y = \frac{1}{\sqrt{2\pi}} e^{\frac{z^2}{2}}$ (B) $Y = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{(X-\mu)^2}{2\sigma^2}}$
   (C) $\sigma = \sqrt{Npq}$ (D) $\sigma = 2\sqrt{Npq}$

4. Tick the correct combination
   (A) Reserve forests, parasitism , tourism
   (B) gulf of mannar, great nicobar, nilgiris
   (C) Taigas, buttresses, cauliflory
   (D) Tundras, epiphytism, serotiny

5. Methods of fossilization include
   (A) Sublimation, impression, predation and dispersion
   (B) Sedimentation, impression, compression and petrifaction
   (C) Nitrification, cryopreservation, compression and pollination
   (D) Denitrification, crystallization, fossilization and preservation

6. Desertification refers to
   (A) Forest degrading to dense taiga
   (B) Forest improving to tundras
   (C) Forest improving to deserts
   (D) Forest degrading to sparse vegetation

7. The enzyme that breaks DNA into segments
   (A) Ligase (B) Amylase
   (C) Endonuclease (D) Polymerase

8. Naked-seeded plant groups include

(A) Lycopods, Cyathea and Alsophila

(B) Cycads, pines and Gnetum

(C) Eucalypts, mints and Jatropha

(D) Magnolias, Myristicas & Myricas

9. Plant and fungal cell wall are respectively made of

(A) Chitin and creatinin

(B) Maltose and lactose

(C) Cellulose and chitin

(D) Glucose and galactose

10. Parasexuality prevails in

(A) Phycomycetes

(B) Ascomycetes

(C) Basidiomycetes

(D) Deuteromycetes

11. Temperate hardwoods include

(A) Pine, spruce, fir and balsams

(B) Maples, oaks, poplars and ashes

(C) Podocarps, cycads, and pines

(D) Pines, yews and larches

12. Succession initiating from aquatic environment is

(A) Hydrosere

(B) Xerosere

(C) Mesosere

(D) None of the above

13. How many net molecules of ATP are produced in glycolysis

(A) 2

(B) 4

(C) 34

(D) 36

14. Predominant tropical pollinators include

(A) Bats

(B) Bees

(C) Birds

(D) Mammals

15. The major problems associated with the lake Victoria is

(A) Introduction of cichlids in to the lake

(B) Invasive species

(C) Presence of toxic chemical in the water that killed all of the animal life

(D) Oil spill

16. Vessels occur in

(A) Some valonia, polysiphonia and lycoperdon

(B) Some selaginella, gnetum and angiosperms

(C) Some riccias, cycads and pines

(D) Some firs, mosses and pines

17. Which provision of ISO emphasise quality management standards?

(A) ISO 14001 (B) ISO 14031

(C) ISO 9000 (D) ISO 14040

18. What is an organism's realized niche?

(A) All the places an organism can survive

(B) Lifestyle an organism pursues and the resources it actually uses

(C) The ecosystem where an animal lives and all the foods available to it

(D) The location that has the most resources available

19. Marine mammals include

(A) Sea cucumber, corals and polychetes

(B) Mammoths, mouse, deer and marsh crocodile

(C) Manatees, dugongs and whales

(D) Caulapa, halimeda and codium

20. Ex-situ conservation areas for live biota include

(A) Reserve forests and swamp forests

(B) Botanic garden and Zoological Parks

(C) Herbaria and Musea

(D) Mangroves and Sacred groves

21. Races of species having a larger body size are generally found in the cooler parts of the range while those having a smaller body size are found in the warmer parts. This rule is known as

(A) Allen's rule (B) Gloger's rule

(C) Bergmann's rule (D) Blackman's rule

22. Seed dormancy is common in

(A) Water-stressed ecosystems (B) Nutrient-stressed ecosystems

(C) Mangrove ecosystem (D) All ecosystems

23. In microbial mining, one of the following organism is utilized

(A) Thiobacillus (B) Clostridium

(C) Pseudomonas (D) Azotobacteria

24. Metamorphosis is common in

(A) Mammals and Aves (B) Paramecium and Euglena

(C) Amphibian and Insects (D) Annelids and nematodes

25. The coefficient of correlation

(A) Has no limits (B) Can be less than one

(C) Varies between ±1 (D) Can be more than one

26. The calculated value of chi-square test is

(A) Always positive (B) Always negative

(C) Can be either positive or negative (D) None of these

27. The genetically engineered "Golden Rice" is rich in?

(A) Vitamin A and nicotinic acid (B) β-Carotene and folic acid

(C) β-Carotene and iron (D) Vitamin A and niacin

28. The reason for signing 1987 Montreal Protocol was

(A) To stop global trade of products made from endangered animals

(B) To do away with the use of CFC's, which were found to be responsible for depletion of the ozone layer

(C) To prohibit and ban nuclear testing in tropical deserts and oceans

(D) To start using renewable sources of energy instead of fossil fuels to reduce the anthropogenic greenhouse effect

29. Radioactive pollution along Kerala coast is due to

(A) Thorium (B) Caesium

(C) Plutonium (D) Zinc

30. Electrostatic precipitators remove

(A) Carbon dioxide (B) Particulate matter

(C) Hydrocarbons (D) None of these

31. The value of ionic product of water is

(A) 1×10^{-23} (B) 1×10^{-14}

(C) 1×10^{-22} (D) 6.023×10^{22}

32. What can be called an 'endangered species'?
(A) Non-native species that affect native species
(B) Species that causes harm to humans
(C) Species killed by poachers
(D) Species with declining populations

33. Which of the following non-biodegradable waste can pollute the earth to dangerous levels of toxicity, if not handled properly
(A) DDT (B) CFC
(C) Radioactive substances (D) PAN

34. The gas which is generally present in the sewer is
(A) CO_2 (B) Methane
(C) H_2S (D) All of these

35. Which of the following is found in both prokaryotic and eukaryotic cells?
(A) Centriole (B) Nucleolus
(C) Peroxisome (D) Ribosome

36. The aquatic thermal strata where no temperature gradients are observed is called as
(A) Hypolimnion (B) Metalimnion
(C) Epilimnion (D) Thermocline

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(C) Peroxisome (D) Ribosome

38. Which region of the earth supports more population?
(A) 0-30° N (B) 30-60° N
(C) 60-90° N (D) None of the above

39. The major pollutants released from thermal power plants are
(A) CO & CO_2 (B) SO_2 & CO_2
(C) $SO_2 - NO_2$ (D) Hydrocarbons

40. Deficiency of sodium and potassium causes
(A) Diarrhoea (B) Headache
(C) Muscular cramps (D) All the above

41. The number of producers and consumers in an ecosystem is mutually controlled by a
(A) Feedback mechanism
(B) Food chain mechanism
(C) Productivity control
(D) Any of these

42. Tip of ecological pyramid is occupied by
(A) Herbivores
(B) Carnivores
(C) Producers
(D) None of these

43. Orderly arrangement of 4 major algal group representatives include
(A) Chara, Cyclotella, Codium,Ulva
(B) Anabaena, Cycas, Pinus, Gnetum
(C) Nostoc, Ulva, Padina, Polysiphonia
(D) Mangifera, Moringa, Ficus & Fucus

44. Temporary hardness of water is due to
(A) Carbonate and bicarbonates
(B) Oxides of divalent compounds
(C) TDS
(D) DOM

45. Gulf of Mannar Biosphere Reserve is known for
(A) Fresh water resources
(B) Giant squirrels and Slender loris
(C) Seagrasses, algae and marine fauna
(D) Crab-eating macaues

46. Tree trunks of humid tropical forests are clothed with
(A) Saprophytes
(B) Parasites
(C) Epiphytes
(D) Hydrophytes

47. Largest leaf and flower respectively are known in
(A) Vanda teesselata and Russelia
(B) Vaccinium neigherrense and Rhamnus
(C) Victoria amazonica and Rafflesia
(D) Viscum orientale and Ruscus

48. The persistent pollutants in the food-chain are increased through
(A) Bioaccumulation
(B) Bioconcentration
(C) Bioexcretion
(D) Biomagnifications

49. Conservation areas are prioritised on

(A) High diversity, endemicity and geographic uniqueness

(B) Low diversity, wide distribution and geological substrate

(C) Climate, soil and cultigens

(D) Human population, climate and soil

50. Causes of coastal pollution include

(A) Oil-spills, effluents, solid dumps, etc

(B) Oil-extraction, aquaculture, agriculture, etc

(C) Over- exploitation of fishery resources

(D) Under-utility of fishery resources

51. CO_2 increase in atmosphere leads to increase in global temperature because

(A) CO_2 is a poor conductor of heat

(B) CO_2 absorbs electromagnetic radiation in the infra-red frequencies

(C) CO_2 is heavier than water vapour and displaces it from lower altitudes

(D) CO_2 has no Hydrogen

52. A population is so male-oriented that couples continue to beget children until one male child is born; but have no further children after the first male is born. The male: female ratio in the population, assuming no bias in conception, would be

(A) 1:1 (B) 2:1

(C) 3:1 (D) None of the above

53. A study of data in 19th century on availability of lynx and hare fur in Canada revealed that there was a cyclic variation with the same period. This is because

(A) each generation of lynx and hare learnt to avoid traps but did not pass this knowledge on to their succeeding generation

(B) newer trappers replaced old ones and they required time to learn

(C) there was a time gap between the availability of hare meat and lynx reproduction in response

(D) overall variation in sunspot activity

54. What is the Raunkiaer system?

(A) Systems for classifying plants by life-form

(B) Part of the photosynthetic cycle

(C) Method to measure light intensity in forests

(D) A method to assess plant diversity

55. Alpha diversity of plants and animals is
(A) Changes in diversity across gradients
(B) Seasonal changes in diversity
(C) Species diversity in one area
(D) Taxonomic classification

56. Model predictions about global climate change indicates that
(A) There are close agreement on trends and values (for example, predicted carbon dioxide concentrations)
(B) No agreement at all
(C) There are close agreement on trends however; little agreement on values
(D) There is general agreement on trends but little agreement on values

57. Prions are
(A) Micro RNA's
(B) A type of virus
(C) A gene sequence
(D) Proteinaceous infectious agent

58. Trophic pyramid in an ecosystem is constructed by estimating the
(A) Food types of animals and plants
(B) Length of the food chain
(C) Relative abundance of each functional feeding group
(D) The total number of functional groups

59. What is a biome?
(A) Vegetation composition in a region
(B) The largest scale of ecological organisation
(C) A marshland
(D) An ecological community

60. Life tables are used for assessing
(A) Food webs
(B) Population growth and regulation
(C) Probability of surviving to a particular age
(D) Livelihood options of communities

61. Population genetics is the study of
(A) Changes in allele frequency and distribution
(B) The quantity of genetic diversity in populations
(C) The heterozygosity and fitness of populations
(D) The rate of phenotypic changes with evolution

62. The characteristics of human placenta is that they are
(A) Haemoendohelial, monodiscoidal and nondeciduate
(B) Haemochorial, monodiscoidal and deciduas
(C) Syndeschomorial, monodiscoidal and deciduate
(D) Superficial, discoidal and deciduate

63. The Competitive Exclusion Principle states that
(A) Two species competing for the same resources cannot coexist
(B) Two related species cannot coexist
(C) Better competitors will specialize
(D) Competition organizes biological communities

64. The exponential growth of populations was proposed by
(A) Malthus (B) Mendel
(C) MacArthur (D) Fisher

65. The Convention on Biological Diversity (CDB) was adopted in
(A) Rio de Janeiro in 1992 (B) Kyoto in 1997
(C) Doha in 2001 (D) Geneva in 2004

66. The main greenhouse gases are
(A) Carbon dioxide, methane, nitrous oxide and sulphur dioxide
(B) Carbon dioxide, carbon monoxide, nitrous oxide and sulphur dioxide
(C) Carbon, methane, nitrous oxide, ethylene and fluorocarbons
(D) Carbon, methane, nitrous oxide and sulphur hexafluoride

67. Carbon sequestration is the
(A) Net removal of CO_2 from the atmosphere
(B) Net release of CO_2 from sinks
(C) Sink-source dynamics
(D) Trends in carbon emissions

68. The Water (Prevention and Control of Pollution) Act 1974
(A) Regulates the discharge of hazardous pollutants into the nations surface water
(B) Regulates the emission of hazardous air pollutants
(C) Regulates waste disposal of sea
(D) Regulates the transportation of hazardous materials

69. The instrument used to measure relative humidity is

(A) Hygrometer (B) Hydrometer

(C) Barometer (D) Thermometer

70. The Chi-square test is used

(A) To compare frequency distributions (B) To assess probabilities

(C) To compare sample means (D) To compare sample variances

71. In a linear model such as $y = ax + b$, the slope is

(A) "y" (B) "x"

(C) "a" (D) "b"

72. The logistic growth curve indicates

(A) Maximal sustainable harvesting

(B) Resource availability in the environment

(C) Density independent growth

(D) Density dependent growth

73. The largest mangrove area in India is

(A) Gulf of Mannar (B) Gulf of Combay

(C) Sundarbans (D) Palk Strait

74. A source of asbestos and other fibrous particles is

(A) Vinyl floor and cement products (B) Foam insulations

(C) Photocopying machine (D) Carpets

75. Tick the order indicating increasing rainfall gradient

(A) Cold deserts, hot deserts, grasslands

(B) Rainforests, savannas and deciduous forests

(C) Grasslands, rainforests and deserts

(D) Deserts, savannas, deciduous and evergreen forests

76. Physical and chemical defence against herbivory are

(A) Thorns and Total phenols (B) Epidermis and Lipids

(C) Vasculature and Glycerol (D) Nectaries and Proteins

77. Weed control is achieved by

(A) Cytological, phrysiological and embryological means
(B) Mechanical, chemical and biological means
(C) Pathological, karyologocal and cytological means
(D) Chronological, cytological and astrological means

78. Biodiversity is dealt at three levels

(A) Ecosystem, climate and soils
(B) Ecosystem species and tissue systems
(C) Genes, species and ecosystem
(D) Genes, cells and tissue systems

79. The entropy of an isolated macroscopic system never decreases, or equivalently, that perpetual motion machines are impossible which is called as

(A) Second law of thermodynamics
(B) Third law of thermodynamics
(C) First law of thermodynamics
(D) None of the above

80. Microorganisms which pass independent life and fix atmospheric nitrogen are known as

(A) Free living organisms
(B) Non-symbiotic nitrogen fixation
(C) Diazotrophs
(D) None of the above

81. Dioecy refers to

(A) Separate male and female flowers
(B) Separate male and female plants
(C) Male and neuter flowers on same plant
(D) Male and female parts in same flower

82. Carnivorous plants include

(A) Paspalum, Wolfia, Pistia, Casuarina
(B) Laurus, Fagus, Mangifera, Quercus
(C) Rhannus, Capparis, Loranthus
(D) Utricularia, Drosera, Nepenthes, Aldrovanda

83. Transgenics are known to be

(A) Disease-prone
(B) Disease-resistant
(C) Disease-inducive
(D) Disease-promotive

84. Tick the set of invasive weeds

(A) Pine , fir, linden
(B) Teak, sal, red sanders
(C) Lantana, Eichhornia, Chromolaena
(D) Gnetum, Connarus, Derris

85. Photoperiodism refers to
(A) Movement towards light
(B) Movement towards gravity
(C) Differential sensitivity of plants to length of dry season
(D) Differential sensitivity of plants to length of day

86. Sustainable use of resources would refer to
(A) Optimal resource harvest within regenerative potential of species
(B) Maximal resource harvest in all seasons
(C) Resource harvest at long time intervals
(D) No resource harvest at all

87. Exotic plants exhibit
(A) Slow growth and low-nutrient efficiency
(B) Fast growth and high-nutrient efficiency
(C) Slow elongation and growth
(D) None of the above

88. Deforestation reduces ———— and increases ————
(A) CO_2 uptake in photosynthesis, and global warming
(B) O_2 uptake in respiration and guttation
(C) N uptake and photosynthesis
(D) P uptake and transpiration

89. Anaerobic conditions are common in
(A) Lentic system (B) Lotic system
(C) Drylands (D) Wetlands

90. Leaflessness in tropical forests occur in
(A) Autumn (B) Spring
(C) Winter (D) Summer

91. Echinoderms include
(A) Finfish, bivalves and gastropods
(B) Shelfish, gastropods and oysters
(C) Star fish, sea urchins and sea cucumbers
(D) Clams, prawns and shrimps

92. Phytoplanktons are the major primary producers
(A) True (B) False

93. Example of unilayered ecosystem is

(A) Tropical savannah
(B) Tropical rain forest
(C) Temperate savannah
(D) Temperate rain forest

94. Invasive aquatic weeds include

(A) Salvenia and Eichornia
(B) Riccia and Marchantia
(C) Agaricus and Lycopodium
(D) Chrorella and Padina

95. Hermaphrodite refers to

(A) Male and female parts in the different flowers of same plant
(B) Male and female parts in the same flower
(C) Male and female flowers in separate plants
(D) Plants with some female and some bisexual flowers

96. Population regulation mechanisms help in

(A) Density reduction and diversity maintenance
(B) Density increase and diversity reduction
(C) Diversity and density increase equally
(D) Diversity and density decrease equally

97. Photosynthesis is the transformation of ———— energy into ———— energy.

(A) Unavailable, available
(B) Light, chemical
(C) Unusable, usable
(D) Mechanical, chemical

98. Evolutionary changes in floral morphology influence evolutionary changes in pollinator morphology and vice versa. This type of evolution is known as

(A) Evolutionary ecology
(B) Ecological evolution
(C) Co-evolution
(D) Macroevolution

99. Tropical rain forests occur in

(A) Polar region, Russia
(B) Central Africa, Central and South America, South and South East Asia
(C) North America, Russia
(D) Deccan Plateau, North America

100. Volitinism in insects pertains to

(A) Spinning
(B) Ecdysis
(C) Moth Emergence
(D) no. Of Generations/yr