2013 December UGC NET Solved Question Paper in Environmental Sciences, Paper III

1. For an overcast day or night, the atmosphere is

(A) Stable

(B) Neutral

(C) Slightly stable

(D) Unstable

Answer: (B)

2. Assertion (A): The energy flow in an ecosystem follows the law of thermodynamics.

Reason (R): The energy flow in an ecosystem is unidirectional and during the transformation of energy from one trophic level to the other, 80 – 90% of energy is lost.

Codes:

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Answer: (A)

3. Match the List – I with List – II and identify the correct answer from the given codes:

List – I (Thermodynamic Variables) (Symbols have their usual meanings.)	List – II (Expression)
(a) ΔG	i. $\Delta E + P\Delta V$
(b) ΔG°	ii. $- n FE^\circ$
(c) ΔS	iii. $RT\, ln\, (V_1/V_2)$

(d) ΔH iv. $nR\, ln\, (V_2/ V_1)$

Codes:

	(a)	(b)	(c)	(d)
(A)	ii	iv	i	iii
(B)	iii	ii	iv	i
(C)	iii	i	iv	ii
(D)	ii	iii	iv	i

Answer: (B)

4. The environmental lapse rate during day time is governed by

(i) Wind speed

(ii) Sunlight

(iii) Topographical features

(iv) Cloud cover

The correct answer is

(A) (i) and (ii) only

(B) (ii) and (iii) only

(C) (i), (ii) and (iii) only

(D) (i) and (iv) only

Answer: (C)

5. The wavelength range of UV–C radiations is

(A) 200 – 280 nm

(B) 180 – 240 nm

(C) 320 – 400 nm

(D) 240 – 300 nm

Answer: (A)

6. In a gas chromatography experiment, the retention factor (R_f) values for pollutant 'A' and pollutant 'B' in a mixture of pollutants were 0.5 and 0.125, respectively. If the distance travelled by solvent front is 12 cms, the distance (in cms) travelled by pollutant 'A' and pollutant 'B' will be

(A) 6 and 1.5

(B) 3 and 1.5

(C) 0.5 and 0.125

(D) 1.5 and 3

Answer: (A)

7. Using the following equations, which can be determined correctly?

$Ca(HCO_3)_2 \longrightarrow^{\Delta} CaCO_3 + H_2O + CO_2$ (by heating) or $Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2\ CaCO_3 + 2H_2O$ (by addition of lime)

(A) Carbon dioxide

(B) Carbonates

(C) Bicarbonates

(D) Carbonates and Bicarbonates

Answer: (D)

8. Assume that a river having dissolved oxygen 0.5 g/m^3, BOD 0.3 g/m^3 flowing at 80 m^3/sec. converge with another river having Dissolved Oxygen 0.7 g/m^3. BOD 0.6 g/m^3flowing at a rate of 60 m^3/sec. If after the confluence the Dissolved Oxygen is 0.59 g/m^3, then the BOD is

(A) 0.83 g/m^3

(B) 0.43 g/m^3

(C) 0.73 g/m^3

(D) 0.92 g/m^3

Answer: (A)

9. Cells grown in a medium containing phosphorous –32 will show radio labelling in

(A) Starch

(B) Glycogen

(C) Proteins

(D) Nucleic acids

Answer: (A)

10. C^{14} has a half-life of 5700 years. The fraction of the C^{14} atoms that decays per year is

(A) 1.216×10^{-4}

(B) 0.52×10^{-3}

(C) 0.78×10^{-4}

(D) 2.81×10^{-4}

Answer: (A)

11. Assertion (A): Marine biodiversity tends to be highest in mid-latitudes in all oceans and along coasts in the Western Pacific.

Reason (R): Sea surface temperature along coasts in the Western Pacific is highest.

Codes:

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Answer: (B)

12. “Double digging” is a method of

(A) Bio-intensive agriculture

(B) Deforestation

(C) Aforestation

(D) Water conservation

Answer: (A)

13. The rate of replacement of species along a gradient of habitats pertains to

(A) Alpha diversity

(B) Beta diversity

(C) Gamma diversity

(D) Species diversity

Answer: (B)

14. Match the List – I and List – II. Choose the correct answer from the given codes:

List – I (Vegetation development)	List – II (Nomenclature of succession)
(a) On a rock	i. Psammosere
(b) On sand	ii. Lithosere
(c) In aquatic habitat	iii. Xerosere
(d) In dry habitat	iv. Hydrosere

Codes:

	(a)	(b)	(c)	(d)
(A)	ii	i	iv	iii
(B)	i	ii	iii	iv

(C) iii iv ii i

(D) iv iii i ii

Answer: (A)

15. If individuals of a species remain alive only in captivity or other human controlled conditions, the species is said to be

(A) Ecologically extinct

(B) Mass extinct

(C) Wild extinct

(D) Anthropogenic extinct

Answer: (C)

16. Which of the following symbolises correct sequence in hydrosere?

(A) Diatoms → Wolffia → Hydrilla → Cyperus → Populus

(B) Hydrilla → Wolffia → Cyperus → Populus → Diatoms

(C) Cyperus → Diatoms → Hydrilla → Wolffia → Populus

(D) Diatoms → Hydrilla → Wolffia → Cyperus → Populus

Answer: (D)

17. Which of the following is not a class of aquatic ecosystems based on salinity levels?

(A) Stagnant water ecosystem

(B) Freshwater ecosystem

(C) Brackish ecosystem

(D) Marine ecosystem

Answer: (A)

18. The K-strategists are

(a) Large organisms which have relatively longer life

(b) Provide care for their offsprings

(c) Organisms that stabilise their population at carrying capacity for the area

Choose the correct answer;

(A) (a) and (b) only

(B) (a) and (c) only

(C) (b) and (c) only

(D) (a), (b) and (c)

Answer: (D)

19. Limnetic zone in freshwater ecosystem is characterised by

(A) Presence of rooted vegetation

(B) Absence of rooted vegetation

(C) Presence of large proportion of lime

(D) Absence of phytoplankton

Answer: (B)

20. Match the List – I with List – II; choose the correct answer from the given codes:

List – I (Plants)	List – II (Family)
(a) Camellia caduca	i. Orchidaceae
(b) Picea brachytyla	ii. Theaceae
(c) Colchicumluteum	iii. Pinaceae
(d) Arachnantha clarkei	iv. Liliaceae

Codes:

	(a)	(b)	(c)	(d)
(A)	iv	ii	iii	i
(B)	i	ii	iii	iv
(C)	ii	i	iv	iii
(D)	ii	iii	iv	i

Answer: (D)

21. Vegetation cover shows maximum reflectance in which of the following regions of the electromagnetic radiation spectrum?

(A) Ultraviolet

(B) Near infrared

(C) Middle infrared

(D) Visible

Answer: (B)

22. During remote sensing of the vegetation cover, the spectral reflection of vegetation over electromagnetic radiation spectrum depends upon

(A) Pigmentation in the leaf

(B) Structure of the leaf

(C) Moisture content of the leaf

(D) All the above characters

Answer: (D)

23. Given below are statements in the context of biogeochemical cycles:

(i) Ecosystems are black boxes for many of the processes that take place within them.

(ii) Ecosystem boundaries are permeable to some degree or other.

(iii) The energy and nutrients can be transferred to and from one ecosystem to another via imports and exports.

Identify the correct answer from the codes given below:

(A) (i) & (ii) only

(B) (ii) & (iii) only

(C) (i) & (iii) only

(D) (i), (ii) and (iii)

Answer: (D)

24. The volume of ejecta and the column height for a volcano are $10^{8.5}$ m^3 and 24 km, respectively. What is its volcanic explosivity index value?

(A) 2

(B) 8

(C) 7

(D) 4

Answer: (D)

25. In the context of material balance in hydrological cycle, which of the following equations is correct for oceans?

(A) Input + change in storage = output

(B) Precipitation + inflow = evaporation

(C) Input – change in storage = output

(D) Precipitation – inflow = evaporation

Answer: (B)

26. In disaster management which steps are followed in post-disaster recovery phase?

(A) Relief, rehabilitation, reconstruction, learning – review

(B) Risk Assessment, mitigation, preparedness, emergency plans.

(C) Relief, mitigation, emergency plans.

(D) Learning – review, emergency plans, preparedness.

Answer: (A)

27. Permafrost represents

(A) Permanently frozen subsurface soil

(B) Frozen leaves of Oak trees

(C) Frozen needles of pine trees

(D) Temporarily frozen subsurface soil

Answer: (A)

28. Assertion (A): Estuaries are productive ecosystems.

Reason (R): Large amounts of nutrients are introduced into the basin from the rivers that run into them.

Choose the correct answer:

(A) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true and (R) is false.

(D) (A) is false and (R) is true.

Answer: (A)

29. A confined aquifer of thickness 25 m has two wells 200 m apart along the direction of flow of water. The difference in their hydraulic heads is 1 m. If hydraulic conductivity is 50 m/day, the rate of flow of water per day per metre of distance perpendicular to the flow of water is

(A) 25 m^3/day per metre

(B) 50 m^3/day per metre

(C) 5 m^3/day per metre

(D) 1 m^3/day per metre

Answer: (C)

30. Which of the following material has the highest hydraulic conductivity?

(A) Clay

(B) Sandstone

(C) Limestone

(D) Quartzite

Answer: (B)

31. Which of the following energy sources is not renewable on human time scale?

(A) Solar

(B) Hydrothermal

(C) Geothermal

(D) Biomass

Answer: (C)

32. For a solar flat plate collector the following data is given: Useful heat gain = 28 watts/m^2 per hour, solar radiation intensity = 350 watts/m^2 per hour and the factor to convert beam radiation to that on the plane of the collector = 1.2. The collector efficiency is

(A) ~ 6.6 %

(B) ~ 4.8 %

(C) ~ 12.2 %

(D) ~ 15.2 %

Answer: (A)

33. For the reaction in a hydrogen oxygen fuel cell,

$H_2 + 1/2\ O_2 = H_2O\ (l)$

Given $\Delta G° = 240$ kJ/gm – mole of H_2 and Faraday's constant = 96,500 Coulomb/gm mole.

The developed voltage in the fuel cell will be

(A) ~ 1.13 Volts

(B) ~ 2.13 Volts

(C) ~ 1.51 Volts

(D) ~ 1.24 Volts

Answer: (D)

34. Identify the correct sequence of the fuels in order of their increasing carbon intensity:

(A) Natural gas < Oil < Bituminous coal < Nuclear

(B) Oil < Coal < Natural gas <Nuclear

(C) Nuclear < Coal < Natural gas <Oil

(D) Nuclear < Natural gas < Oil <Bituminous coal

Answer: (D)

35. In nuclear thermal reactors, which of the following is not used as moderator?

(A) Normal water

(B) Heavy water

(C) Graphite

(D) Liquid Helium

Answer: (D)

36. The minimum temperature gradient (°C/km) required for OTEC is about

(A) 20

(B) 10

(C) 40

(D) 60

Answer: (A)

37. A solar pond has electricity generating capacity of 600 MWe. If the efficiency of solar energy to electric generation process was 2% and solar energy supply rate was 300 W/m^2, what is the area of solar pond?

(A) 100 km^2

(B) 90 km^2

(C) 60 km^2

(D) 180 km^2

Answer: (A)

38. Which of the following causes warming of atmosphere but cooling of the earth's surface?

(A) Ozone

(B) Black carbon aerosols

(C) All Greenhouse gases

(D) Sulphates and nitrates

Answer: (B)

39. Assertion (A): For noise level surveys in urban areas, weighting A is used for measurements.

Reason (R): Weighting a filters out unwanted signals.

Codes:

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) Both (A) and (R) are false.

Answer: (C)

40. Noise levels of 80 dB refers to a sound pressure level of

(A) 0.2 Pa

(B) 0.02 Pa

(C) 20 Pa

(D) 200 Pa

Answer: (A)

41. Asphyxiation is caused by

(A) HCN, $COCl_2$

(B) NO_x

(C) $CHCl_3$

(D) AsH_3

Answer: (A)

42. Sequence of a typical sewage treatment plant operation process will be

(A) Aeration → Flocculation → Sedimentation → Recarbonation → Filtration → Disinfection

(B) Aeration → Sedimentation → Flocculation → Filtration → Recarbonation → Disinfection

(C) Flocculation → Aeration →Recarbonation → Sedimentation → Filtration → Disinfection

(D) Sedimentation → Flocculation → Aeration → Filtration → Recarbonation → Disinfection

Answer: (A)

43. Which one of the following isotopes has maximum half-life period?

(A) Rn^{222}

(B) Pb^{210}

(C) Ti^{210}

(D) Bi^{210}

Answer: (B)

44. Match the List – I with List – II and identify the correct answer from given codes:

List – I (Aerosols)	List – II (Constituents)
(a) Dust	i. Small gas borne particles resulting from combustion
(b) Mist	ii. Black carbon
(c) Smoke	iii. Suspended small liquid droplets
(d) Atmospheric Brown Cloud	iv. Solid suspended particles

Codes:

	(a)	(b)	(c)	(d)
(A)	iv	iii	ii	i
(B)	iii	iv	i	ii
(C)	ii	i	iii	iv
(D)	i	ii	iii	iv

Answer: (A)

45. Assertion (A): Chlorofluorocarbons deplete ozone.

Reason (R): These compounds contain chlorine, bromine and fluorine.

Codes:

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Answer: (C)

46. Which of the following organic compounds is not of biogenic origin?

(A) Isoprene

(B) α-pinene

(C) Myrcene

(D) Acrolein

Answer: (D)

47. Which of the following is used as plant indicator for detection of presence of SO_2 and HF in air?

(A) Lichen

(B) Orchid

(C) Apricot

(D) Tobacco

Answer: (A)

48. Integrated Gasification Combined Cycle (IGCC) technology is best at removing

(A) NO_2 and CO

(B) CO and SO_2

(C) Particulates and sulphur

(D) NO_2 and SO_2

Answer: (C)

49. A wastewater treatment plant in a city treats 50,000 m^3 wastewater generated per day. For an average flow rate of 25 m^3 per day per sq. metre, what should be the diameter of the circular primary settling tank?

(A) 50.4 m

(B) 30.6 m

(C) 20 m

(D) 25.8 m

Answer: (A)

50. An Electrostatic Precipitator (ESP) with collector plate area = 5000 m^2 treats a flue gas with drift velocity = 0.12 m/s with 98% efficiency. The volumetric flow rate (m^3/s) of the flue gas is

(A) ~ 175.2

(B) ~ 213.5

(C) ~ 153.4

(D) ~ 198.9

Answer: (C)

51. Assertion (A): Urban heat islands contribute to build up of pollutants in cities.

Reason (R): Urban heat islands produce a somewhat stable air mass in the city's atmosphere.

Codes:

(A) Both (A) and (R) are correct and (R) is the correct\ explanation of (A).

(B) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) Both (A) and (R) are false.

Answer: (A)

52. Match List – I with List – II and choose the correct answer from the codes given below:

List – I (Analytical functions)	List – II (Activity under the function)
(a) Defining scope of EIA	i. Critical Assessment of impacts
(b) Identification of impacts	ii. Estimation of the probability that a particular impact will occur
(c) Prediction of Impacts	iii. Description of the existing environment system
(d) Impact Evaluation and Analysis	iv. Deciding important issues and concerns

Codes:

	(a)	(b)	(c)	(d)
(A)	iii	iv	i	ii
(B)	iv	iii	ii	i
(C)	ii	i	iii	iv
(D)	i	ii	iv	iii

Answer: (B)

53. A drawback of checklists is

(A) Preliminary analysis is available in scaling checklist

(B) Checklists are too general or incomplete

(C) Checklists summarises information to make it available to experts

(D) Ecosystem functions can be clearly understood from weighting methods

Answer: (B)

Answer: (C)

55. Match List – I with List – II and choose the correct answer from the codes given below:

List – I (Scales used in EIA methods)	List – II (Example)
(a) Nominal	i. Temperature (degrees)
(b) Ordinal	ii. Species classification
(c) Interval	iii. Map scale
(d) Ratio	iv. Worst to best

Codes:

	(a)	(b)	(c)	(d)
(A)	i	ii	iii	iv
(B)	iv	iii	ii	i
(C)	iii	i	iv	ii
(D)	ii	iv	i	iii

Answer: (D)

56. Risk assessment in EIA does not involve

(A) Maximum credible analysis

(B) Hazard and operability studies

(C) Preparation of disaster management plan

(D) Assessment of economic benefit arising out of a project

Answer: (D)

57. In a gravity flow autoclave, medical waste is subjected to a temperature

(A) > 120 °C

(B) < 100 °C

(C) > 300 °C

(D) > 800 °C

Answer: (A)

58. Hierarchy of priorities in hazardous waste management is

(A) Eliminate generation → Reduce generation → Recycle / Reuse → Treatment → Disposal

(B) Reduce generation → Eliminate generation → Recycle/Reuse → Treatment → Disposal

(C) Eliminate generation → Reduce generation → Treatment → Recycle/Reuse → Disposal

(D) Reduce generation → Eliminate generation → Treatment → Recycle/Reuse → Disposal

Answer: (A)

59. Public Liability Insurance Act was enacted in the year

(A) 1991

(B) 1993

(C) 1995

(D) 1997

Answer: (A)

60. Match List – I with List – II and choose the correct answer from the codes given below:

List – I List – II

(Convention)	(Year)
(a) Convention for the protection of the ozone layer	i. 1979
(b) Conservation of migratory species of wild animals	ii. 1985
(c) Kyoto protocol	iii. 1982
(d) UN Convention on the law of the sea	iv. 1997

Codes:

	(a)	(b)	(c)	(d)
(A)	ii	i	iv	iii
(B)	ii	iv	iii	i
(C)	iii	i	ii	iv
(D)	i	ii	iii	iv

Answer: (A)

61. Match List – I with List – II and choose the correct answer from the codes given below:

List – I	List – II
(Acts)	(Year when enacted)
(a) Wildlife Protection Act	i. 1980
(b) Forest Conservation Act	ii. 1972
(c) Air (Prevention and Control of Pollution) Act	iii. 1974
(d) Water (Prevention and Control of Pollution) Act	iv. 1981

Codes:

	(a)	(b)	(c)	(d)
(A)	ii	i	iv	iii
(B)	i	ii	iii	iv
(C)	iii	ii	i	iv

(D) iv iii ii i

Answer: (A)

62. Assertion (A): χ^2 distribution is a non-parametric distribution.

Reason (R): χ^2 is a sample statistic having no corresponding population parameter.

Codes:

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).

(B) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) Both (A) and (R) are false.

Answer: (A)

63. In a simple regression analysis of y on x, the standard error of estimate of y on x, $S_{yx} = 5$, number of observations N is 30, and $\sum y^2 = 2000$. The unexplained variance is

(A) 1500

(B) 750

(C) 500

(D) 250

Answer: (B)

64. Two normal populations have variances $\sigma^2_1 = 10$ and $\sigma^2_2 = 20$. Two random samples of sizes 25 and 20, independently selected from these populations have variances of $S^2_1 = 8$ and $S^2_2 = 15$, respectively. What is the $F_{(24, 19)}$ statistic?

(A) 1

(B) 2

(C) 2.81

(D) 3.6

Answer: (A)

65. Assertion (A): A matrix is nonsingular if and only if none of its eigen values is zero.

Reason (R): The product of the eigen values equals the determinant of a matrix.

Codes:

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).

(B) Both (A) and (R) are correct, but (R) is not the correct explanation of (A).

(C) (A) is correct, but (R) is false.

(D) Both (A) and (R) are false.

Answer: (A)

66. In Gaussian Plume Model assume $\sigma_z = cx$ where c is a constant and ratio of σ_y to σ_z to be a constant. If H is the effective height of the stack, the maximum concentration at a distance (x) from the stack is proportional to

(A) H^{-1}

(B) H^{-2}

(C) $\exp(-H^2)$

(D) $H^{-3/2}$

Answer: (B)

67. The Pearson Linear correlation coefficient (r) for the following paired data (x, y): (2, 1.4) (4, 1.8), (8, 2.1), (8, 2.3), (9, 2.6) is

(A) 0.623

(B) – 0.572

(C) 0.957

(D) 0.823

Answer: (C)

68. In a rough terrain the wind speed at a height of 10 m is 2.5 m/s. The wind speed at an elevation of 300 m will be

(A) 4.9 m/s

(B) 1.2 m/s

(C) 3.6 m/s

(D) 7.9 m/s

Answer: (A)

69. In the context of $REDD^{+}$ initiatives the land clearing in forest areas is primarily concerned with

(A) Physical resources of the area

(B) Ecology of the area

(C) Carbon budget of the area

(D) Water resources of the area

Answer: (C)

70. What was the objective of Basel Convention (1989) under UNEP?

I. Minimize generation of hazardous wastes in terms of quantity and hazardousness

II. Disposal of hazardous wastes as close to the source of generation as possible.

III. Reduce the movement of hazardous wastes.

Choose the correct code:

(A) I and II only.

(B) II and III only.

(C) I, II and III.

(D) I only.

Answer: (C)

71. Global Warming Potential (GWP) of a greenhouse gas (GHG) is a comparison of global warming impact between

(A) 1 kg of GHG and 1 kg of methane

(B) 1 kg of GHG and 1 kg of CO_2

(C) 1 kg of GHG and 1 kg of N_2O

(D) 1 kg of GHG and 1 kg of CFC-11

Answer: (B)

72. Which of the following mixture of gases is called biogas?

(A) CO_2, CH_4, NH_3, H_2S, H_2O (vapour)

(B) CO, CH_4, NH_3, H_2S, H_2O (vapour)

(C) CO_2, CH_4, N_2O, NH_3, H_2O (vapour)

(D) CO_2, NO_x, H_2O, CH_4

Answer: (A)

73. Environmental ethics deal with moral relationship of human beings to

(A) the value and moral status of the environment and its nonhuman contents

(B) the values that is important to development and economic growth

(C) the conservation values of selected species

(D) the development of genetically modified organisms

Answer: (A)

74. The major source of BaP (Benzo-apyrene) in atmospheric environment is

(A) residential wood burning

(B) gasoline

(C) coal tar

(D) cooked meat

Answer: (A)

75. Match the List – I with List – II and choose the correct answer from the codes given below:

List – I (Materials)	List – II (Applications)
(a) Trichloroethylene	1. Gasoline
(b) Toluene	2. Wood treatment
(c) Zinc	3. Dry cleaning
(d) Phenol	4. Mining

Codes:

	(a)	(b)	(c)	(d)
(A)	3	1	4	2
(B)	2	3	1	4
(C)	1	4	2	3
(D)	4	2	3	1

Answer: (A)