POST GRADUATE COMMON ENTRANCE TEST-2016

DATE and TIME	COURSE	SUBJECT
03-07-2016 2.30 p.m. to 4.30 p.m.	ME/M.Tech/M.Arch/ courses offered by VTU/UVCE/UBDTCE	ENVIRONMENTAL ENGINEERING

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
100	150 Minutes	120 Minutes

MENTION YOUR PGCET NO.					QUESTION BOOKLET DETAILS	
					VERSION CODE	SERIAL NUMBER
					A - 1	209048

DOs :

1. Check whether the PGCET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. Ensure whether the circles corresponding to course and the specific branch have been shaded on the OMR answer sheet.
3. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 2.25 p.m.**
4. The Serial Number of this question booklet should be entered and the respective circles should also be shaded completely on the OMR answer sheet.
5. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely on the OMR answer sheet.
6. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. **The 3rd Bell rings at 2.30 p.m., till then;**
   - Do not remove the paper seal / polythene bag of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 75 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the **3rd Bell is rung at 2.30 p.m.,** remove the paper seal / polythene bag of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 120 minutes:
   - Read each question (item) carefully.
   - Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **only one response** for each item.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

(A) (●) (C) (D)

4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
5. After the **last Bell is rung at 4.30 pm,** stop marking on the OMR answer sheet and affix your **left hand thumb impression** on the OMR answer sheet as per the instructions.
6. Handover the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of **ONE year.**
9. Only **Non-programmable** calculators are allowed.

Marks Distribution

PART-1 : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
PART-2 : 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)

EN-A1

ENVIRONMENTAL ENGINEERING
PART - 1

Each question carries one mark. **(50 × 1 = 50**

1. The primary producers in a forest ecosystem are

(A) Chlorophyll containing trees and plants

(B) Bacteria and other microorganisms

(C) Herbivores

(D) Carnivores

2. Which of the following is natural ecosystem ?

(A) Forest

(B) Desert

(C) Freshwater

(D) All of the above

3. The concentration of pollutants in successive trophic levels is known as

(A) Biomagnification

(B) Bioaccumulation

(C) Bioremediation

(D) None of the above

4. During Environmental Impact Assessment, the proposed project location should be reviewed in relation to

(A) Ambient air, water and noise quality standards

(B) Critically polluted areas

(C) Ecologically sensitive areas

(D) All of the above

5. The Initial Project Description in EIA include

(A) Off-site activities

(B) Associated activities

(C) Expected project induced activities

(D) All of the above

6. Environmental Impact Statement should contain

(A) Description of the site or environment.

(B) Suggest the modification in proposed project.

(C) Environmental impact of the proposed activity or project.

(D) All of the above

Space For Rough Work

7. For environmental impact prediction the model used for surface water environment is

(A) QUAL-II E

(B) Dhawani

(C) ISCST

(D) None of the above

8. In material balance relationship the net rate of accumulation within the control volume is equal to

(A) Rate of mass input across control volume

(B) Rate of mass output across control volume

(C) Rate of chemical reaction within control volume

(D) (A) – (B) + (C) of above

9. The rate of reaction and completeness of removal of pollutants by adsorption is dependent on

(A) pH

(B) Temperature

(C) Initial concentration

(D) All of the above

10. Free energy is defined as

(A) $G = H - TS$

(B) $G = H + TS$

(C) $G = TH - S$

(D) $G = TH + S$

11. The adsorption capacity of activated carbon is determined by the use of

(A) Freundlich Isotherm

(B) Langmuir Isotherm

(C) BET Isotherm

(D) All of the above

12. Eutrophication is

(A) A water purification technique.

(B) A process in carbon cycle.

(C) An improved quality of water in lakes.

(D) Accumulation of plant nutrients in water bodies.

Space For Rough Work

13. In the river body itself the sources of DO are

(A) Reaeration from atmosphere

(B) Photosynthetic oxygen production

(C) DO from incoming tributaries

(D) All of the above

14. The turbulent jet behaviour depends on

(A) Jet Parameters

(B) Environmental Parameters

(C) Geometrical Parameters

(D) All of the above

15. Many people died in London in 1952 as a result of

(A) Fog

(B) Mist

(C) Smog

(D) Smoke

16. The major atmospheric gas layer in stratosphere is

(A) Hydrogen

(B) Carbon dioxide

(C) Ozone

(D) Helium

17. Smog is

(A) Combination of dust and SO_x.

(B) Combination of smoke and Fog.

(C) Combination of dust and NO_x.

(D) All of the above

18. Which greenhouse gas is known as colourless, non-flammable, sweetish odour & laughing gas ?

(A) Methane

(B) CO_2

(C) Nitrous Oxide

(D) Sulphur hexa fluoride

Space For Rough Work

19. The important device often used to control particulate matter is/are

(A) Gravity settling chamber

(B) Cyclone collectors

(C) Fabric filters

(D) All of the above

20. The Air (Prevention & Control of Pollution) Act was enacted in the year

(A) 1981

(B) 1996

(C) 2000

(D) 1974

21. Haemoglobin of the blood forms Carboxy-haemoglobin with

(A) SO_2

(B) NO_2

(C) CO

(D) CO_2

22. While testing for COD of sewage, the organic matter is oxidized by K_2 Cr_2 O_7 in the presence of

(A) HC*l*

(B) H_2SO_4

(C) HNO_3

(D) None of these

23. Air binding may occur in

(A) Sewers

(B) Artesian wells

(C) Aerators

(D) Filters

24. The pH of fresh sewage is usually

(A) Less than 7

(B) More than 7

(C) Equal to 7

(D) None of these

Space For Rough Work

25. In aerobic environment the nitrosomanas converts

(A) NH_3 to NO_2

(B) NO_2^- to NO_3

(C) NH_3 to N_2O

(D) NO_2^- to HNO_3^-

26. The ratio of 5 day BOD to ultimate BOD is about

(A) 1/3

(B) 2/3

(C) 3/4

(D) 4/5

27. The process in which chlorination is done beyond the break point is

(A) Pre-chlorination

(B) Post chlorination

(C) Super chlorination

(D) Break point chlorination

28. The purpose of providing a balancing reservoir in water supply distribution to

(A) Equalizing pressure in the distribution system.

(B) Store adequate quantity of water to meet requirement in the case of breakdown of inflow.

(C) Store adequate fire fighting reservoir.

(D) Take care of fluctuation in the rate of consumption.

29. Shallow horizontal tunnels constructed along the river on its bank to intercept ground water are called

(A) Canals

(B) Infiltration galleries

(C) Springs

(D) Lakes

30. In India the storage water for fire on percapita basis is generally taken as

(A) 2 Lts

(B) 3 Lts

(C) 5 Lts

(D) 10 Lts

Space For Rough Work

31. Mottling of teeth is associated with the presence of

(A) Chlorides in water

(B) Fluorides in water

(C) Calcium in water

(D) Sulphur in water

32. If the coliform bacteria is present in water, then the test carried out is

(A) Presumptive coliform test

(B) Confirmed coliform test

(C) Completed coliform test

(D) All of the above

33. Under Indian conditions, the average per capita contribution of BOD is

(A) 10 to 20 g/day

(B) 20 to 35 g/day

(C) 35 to 50 g/day

(D) 50 to 75 g/day

34. Self purification of running stream may be due to

(A) Sedimentation, Oxidation & Coagulation

(B) Dilution, Sedimentation & Oxidation

(C) Dilution, Sedimentation & Coagulation

(D) Dilution, Coagulation & Oxidation

35. Which one of the following sewage treatment unit has a Parshell flume ?

(A) Trickling filter

(B) Oxidation ditch

(C) Grit chamber

(D) Aerated Lagoons

36. The trap used for a water closet is called

(A) Gully trap

(B) P trap

(C) Intercepting trap

(D) Antisiphon trap

37. Bacteria which uses CO_2 as a source of carbon are known as

(A) Aerobic

(B) Autotrophic

(C) Heterotrophic

(D) Anaerobic

Space For Rough Work

38. Pathogenic bacteria in water causes

(A) Typhoid

(B) Cholera

(C) Dysentery

(D) All the above

39. The flow in an open channel is called steady, if

(A) The channel is always runfull.

(B) The velocity of fluid remains constant with respect to time.

(C) The discharge remains maximum.

(D) The head loss does not change with respect to time.

40. A unit hydrograph gives correlation between

(A) The total rainfall & total runoff

(B) Cumulative rainfall & first runoff

(C) Effective rainfall & the total runoff

(D) Effective rainfall & direct runoff

41. The S curve can be used to obtain a unit hydrograph from that of

(A) Longer duration

(B) Normal duration

(C) Shorter duration

(D) Both (A) & (C)

42. Most of the formula for flood discharge are of the form

(A) $Q = CA^n$

(B) $Q = Ce^n$

(C) $Q = C \log_e^{(n)}$

(D) $Q = C + A + n$

43. World Environmental Day is on

(A) June 4

(B) June 5

(C) June 6

(D) June 7

44. In Bernoulli's equation used in pipe flow each terms represents

(A) Energy per unit weight

(B) Energy per unit mass

(C) Energy per unit volume

(D) Energy per unit flow length

Space For Rough Work

45. The sources of ground water and soil contamination are

(A) Infiltration from ponds and lagoons

(B) Industrial chemical spills

(C) Leachate from solid waste dumping site

(D) All of the above

46. The movement of a solvent through a membrane that is impermeable to a solute is

(A) Osmosis

(B) Dialysis

(C) Adsorption

(D) None of the above

47. Nitrification process in a stream is

(A) Zero order reaction

(B) Enzyme reaction

(C) Consecutive reaction

(D) None of the above

48. The oxygen consuming property of the wastewater expressed in terms of oxygen that is consumed biologically is

(A) BOD

(B) COD

(C) TOC

(D) All of the above

49. Most suitable section of sewer in separate sewerage system is

(A) Rectangular section

(B) Circular section

(C) Standard egg shaped sewer

(D) Modified egg shaped section

50. Which of the following statement explain the term pyrolysis ?

(A) Solid waste is heated in closed container in oxygen-free atmosphere.

(B) Solid waste is incinerated in presence of oxygen.

(C) Wastewater is aerated with oxygen.

(D) Dissolved solids from water are removed by glass distillation.

Space For Rough Work

PART - 2

Each question carries two marks. **(25 × 2 = 50)**

51. The effluent containing chloride concentration of 5000 mg/L is discharged from a sewage treatment plant to a stream. The upstream (background) concentration of chloride is 50 mg/L. If the effluent flow is 200 m^3/day and stream flow is 2456 m^3/day, what is the resulting chloride concentration in the mixed stream ?

(A) 180 mg/L

(B) 270 mg/L

(C) 423 mg/L

(D) 540 mg/L

52. What is the ionic strength of water containing $Ca^{++} = 2 \times 10^{-3}$ M; $HCO_3^- = 3 \times 10^{-3}$ M; $Na^+ = 0.5 \times 10^{-3}$ M; $Cl^- = 1.5 \times 10^{-3}$ M ?

(A) 4.5×10^{-1} moles/L

(B) 4.5×10^{-3} moles/L

(C) 6.5×10^{-3} moles/L

(D) 6.5×10^{-4} moles/L

53. The simplified biochemical reaction for photosynthesis is

(A) $CH_2O + O_2 \xrightarrow{light} CO_2 + H_2O$

(B) $CH_2O + N_2 \longrightarrow CN_2 + H_2O$

(C) $CO_2 + 2H_2O \xrightarrow{light} CH_2O + O_2 + H_2O$

(D) $CO + 2H_2O \xrightarrow{dark} CH_2 + O + H_2O$

54. The plume behaviour when there exists a strong adiabatic lapse rate above the surface inversion, downward motion and mixing is prevented, the upward mixing is quite turbulent and rapid is a

(A) Looping plume

(B) Coning plume

(C) Lofting plume

(D) Trapping plume

Space For Rough Work

55. The important devices often used to control particulate matter are

(A) Gravity settling chamber

(B) Cyclone collectors

(C) Fabric filters

(D) All of the above

56. What is the ionic strength of water containing 0.01 M of $MgCl_2$ and 0.02 M $NaSO_4$?

(A) 0.090

(B) 0.072

(C) 0.063

(D) 0.054

57. O' Connor and Dobbin's equation for estimating reaction constant at 20 °C is

(A) $K_2 = 3.93\ V^{0.5}/d^{-1.5}$

(B) $K_2 = 5.23\ V/d^{-1.67}$

(C) $K_2 = 5.32\ V^{0.67}/d^{-1.85}$

(D) $K_2 = 3.1 \times 10^4 VS_0$

58. In the river body itself the sources of dissolved oxygen are

(A) Reaeration from atmosphere

(B) Photosynthetic oxygen production

(C) DO from incoming tributaries

(D) All of the above

59. If the chemical is conservative than the mass balances given by

(A) Accumulation = inputs – outflows

(B) Accumulation = inputs – outflows+ – reaction

(C) Accumulation = inputs + outflows

(D) Accumulation = inputs – reaction

60. What is the reaeration rate constant in a plug flow stream having a velocity of 0.3048 with a mean depth of 1.056 m ?

(A) 1 day^{-1}

(B) 2 day^{-1}

(C) 3 day^{-1}

(D) 4 day^{-1}

Space For Rough Work

61. If k is the first order reaction rate constant and k_2 is the reaeration constant then critical dissolved oxygen deficit in river is calculated by

(A) $Dc = k_2/k(L_o e^{-ktc})$

(B) $Dc = k/k_2(L_o e^{-kbc})$

(C) $Dc = k\,k_2(L_o e^{-ktc})$

(D) $Dc = k/k_2(L_o e^{-kx})$

62. The MLSS concentration in the aeration tank of Extended aeration activated sludge process is 4000 mg/L. If 1 litre of sample settled in 30 minutes and the measuring cylinder showed sludge volume of 200 ml then the sludge volume index would be nearly

(A) 200

(B) 150

(C) 75

(D) 50

63. The working condition in Imhoff tank are

(A) Aerobic only

(B) Anaerobic only

(C) Aerobic in lower compartment & anerobic in upper compartment

(D) Anaerobic in lower compartment & aerobic in upper compartment

64. The relation between Theoretical Oxygen Demand (ThOD), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) is given by

(A) ThOD >BOD> COD

(B) ThOD>COD>BOD

(C) BOD>ThOD>COD

(D) BOD>COD>ThOD

Space For Rough Work

65. The function of algae in an oxidation pond is to

(A) Provide a mat over the surface of the oxidation of the oxidation pond to prevent evaporation of water.

(B) Provide oxygen for bacteria to degrade organic water.

(C) Provide a greenish appearance to the pond.

(D) Prevent the odour nuisance.

66. A city supplies 16000 m^3 of treated water per day with chlorine dosage of 0.6 ppm, for this purpose, the requirement of bleaching powder per day with available chlorine of 30 % would be

(A) 32 kg

(B) 16 kg

(C) 18 kg

(D) 22 kg

67. The overflow rate of plain sedimentation tank is

(A) 500 – 750 L/h/m^2

(B) 1000 – 1550 L/h/m^2

(C) 1500 – 2000 L/h/m^2

(D) 2500 – 3000 L/h/m^2

68. For sedimentation with coagulation, the detention period varies from

(A) 1 – 2 hours

(B) 2 – 4 hours

(C) 4 – 8 hours

(D) 8 – 12 hours

69. The specific speed of a turbine under a head of 150 mts to develop 2000 HP while running at 300 rpm is

(A) 25.6

(B) 35.6

(C) 65.6

(D) 75.6

Space For Rough Work

70. When the water surface coincides with the top edge of the rectangular vertical gate 40 m (wide) × 3 m (deep), then the depth of center of pressure is

(A) 1 mt

(B) 1.5 mts

(C) 2 mts

(D) 2.5 mts

71. The sequent depth ratio in a hydraulic jump formed in a horizontal rectangular channel is 16.48. The flow is supercritical. What is the value of the Frouds number ?

(A) 4

(B) 8

(C) 12

(D) 18

72. If total hardness of water is greater than its total alkalinity, then carbonate hardness will be equal to

(A) Total alkalinity

(B) Total hardness

(C) Total hardness – total alkalinity

(D) Non – carbonate hardness

73. For a given discharge, efficiency of sedimentation tank can be increased by

(A) Increasing depth of tank.

(B) Decreasing depth of tank.

(C) Increasing surface area of tank.

(D) Decreasing surface area of tank.

74. The description of solid waste collection as follows :

Night soil – 35 t

Rubbish – 40 t

Debris – 25 t

Garbage – 40 t

Organic solids in the above composition is

(A) 35 t

(B) 75 t

(C) 60 t

(D) 100 t

75. Which of the following are storm water regulators ?

(A) Side weir

(B) Leaping weir

(C) Symphonic spillway

(D) All of these

Space For Rough Work

Space for Rough Work