PGCET-2014

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 10.25 a.m.**
4. The Serial Number of this question booklet should be entered 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.
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 10.30 a.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 10.30 a.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.**
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 12.30 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. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet, 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-A4

[Turn Over

ENVIRONMENTAL ENGINEERING
PART - 1

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

1. A Pipe line consisting of several pipes of varying diameter and lengths may be replaced by an equivalent pipe of length 'L' equal to

    (A) $D^4 (l_1/d_1^4 + l_2/d_2^4 + l_3/d_3^4 + - -$ (B) $D^2 (l_1/d_1^2 + l_2/d_2^2 + l_3/d_3^2 + - -$

    (C) $D (l_1/d_1 + l_2/d_2 + l_3/d_3 + - -$ (D) $D^5 (l_1/d_1^5 + l_2/d_2^5 + l_3/d_3^5 + - -$

2. The unit hydrograph theory is enunciated by

    (A) Euler   (B) Bernoulli

    (C) L.K. Sherman   (D) Hortom

3. The rainfall cycle period in India is taken as

    (A) 20 Years   (B) 25 Years

    (C) 35 Years   (D) 30 Years

4. The radius of influences is

    (A) The radius of the main well.

    (B) The distance from the well face to the point of zero draw down.

    (C) The distance from the center of the main well to point of zero draw down.

    (D) None of the above

5. Imhoff cone is used to determine

    (A) Colloidal solids   (B) Total solids

    (C) Settleable solids   (D) Dissolved solids

6. If D.O concentration falls down to zero in any natural drainage, it indicates

    (A) Zone of degradation   (B) Zone of active decomposition

    (C) Zone of recollecting   (D) Zone of clear water

Space For Rough Work

7. The overflow rates for primary sedimentation tank ranges between

(A) 25 to 35 m^3/m^2 - day

(B) 30 to 35 m^3/m^2 - day

(C) 40 to 50 m^3/m^2 - day

(D) 50 to 60 m^3/m^2 - day

8. The water supply to the office building is provided at the rate of

(A) 50 LPCD

(B) 60 LPCD

(C) 45 LPCD

(D) 75 LPCD

9. The term refuse generally does not include

(A) Putricible water

(B) Excreta

(C) Nonputricible solid water

(D) Ashes

10. The Bangalore method & Indore method of Solid water are

(A) Identical

(B) Different as Bangalore method is an anaerobic method

(C) Different as Bangalore method does not contain human excreta

(D) Different as Indore method is an incineration method

11. In rapid sand filter Air binding is caused due to excessive

(A) Pressure

(B) Negative pressure

(C) Turbidity

(D) Low porosity

12. Darcy's Law is applicable to seepage if the soil is

(A) Homogeneous

(B) Isotropes

(C) Incompressible

(D) All the above

Space For Rough Work

13. Transport in the environment which results in fluid motion is _____ .

   (A)   Convection   (B)   Diffusion

   (C)   Advection   (D)   Transpiration

14. The slope of dose response curve in toxicity studies is called_____

   (A)   Shape factor   (B)   Potency factor

   (C)   Toxic factor   (D)   None of the above

15. The aerosols have effective diameter less than

   (A)   20 µm   (B)   25 µm

   (C)   10 µm   (D)   5 µm

16. Aluminium concentration in drinking water not to exceed____

   (A)   0.8 ppm   (B)   0.4 ppm

   (C)   0.5 ppm   (D)   0.2 ppm

17. The sludge volume index for a good sludge ranges between____

   (A)   300 – 400 ml/gm   (B)   50 –100 ml/gm

   (C)   100 – 200 ml/gm   (D)   less than 50 ml/gm

18. Which of the following pollutant is known to cause many annoying respiratory effects ?

   (A)   SPM   (B)   Benzo-a-pyrene

   (C)   Photo chemical smog   (D)   None of these

Space For Rough Work

19. In the preliminary studies of EIA, the area falling within _____ km radius of the project proposed is considered.

    (A) 10 – 15   (B) 20 – 30

    (C) 5 – 10   (D) all the above

20. The term EIA came into existence through NEPA on

    (A) 20 Jan., 1972   (B) 1 Jan., 1970

    (C) 15 Aug., 1980   (D) 10 Jan., 1980

21. The disturbances caused to the Bio – Geo Chemical cycles of the nature are called

    (A) Biological disorders   (B) Geological disorders

    (C) Ecological disorders   (D) Chemical disorders

22. If the phosphorous to be the limiting nutrient for algal growth in lakes the N : P ratio is

    (A) > 1   (B) < 1

    (C) = 1   (D) None of these

23. The region of the atmosphere above the thermosphere is called

    (A) Ionosphere   (B) Mesosphere

    (C) Biosphere   (D) Exosphere

24. The turbidity of water is expressed in _____

    (A) mg/L   (B) NTU

    (C) JTU   (D) All the above

Space For Rough Work

25. The Nessler's reagent is an_____

    (A) Acidic solution   (B) Alkaline solution

    (C) Neutral solution   (D) None of these

26. Chlorine added to control growth of algae in water is called_____

    (A) Break point chlorination   (B) Post chlorination

    (C) Super chlorination   (D) Pre chlorination

27. The oxidizing agent used in COD determination is

    (A) Potassium chromate   (B) Sulphuric acid

    (C) Ferroin   (D) Potassium dichromate

28. If the aerobic treatment process is to be effective the BOD : N : P ratio should be _____.

    (A) 100 : 2.5 : 1   (B) 100 : 5 : 1

    (C) 100 : 5 : 0.5   (D) 100 : 2.5 : 0.5

29. Heavy metals generally have the density more than _____ times the density of water.

    (A) 2   (B) 5

    (C) 10   (D) 4

30. Aldehydes are the product of incomplete combustion of_____

    (A) Coal   (B) Hydrocarbon

    (C) Vegetable oil   (D) All the above

31. The city in india where the centre for GEMS network is established

    (A) Delhi   (B) Mumbai

    (C) Chennai   (D) Calcutta

Space For Rough Work

32. The ambient air quality standard in respect of SPM for sensitive area is

    (A) 500 $\mu g / m^3$ (B) 200 $\mu g / m^3$

    (C) 100 $\mu g / m^3$ (D) 80 $\mu g / m^3$

33. Ringelmann chart method is used to determine

    (A) Air density   (B) Fuel density

    (C) Smoke density   (D) All the above

34. The amount of carbon released per unit of energy delivered is known as

    (A) Carbon rate   (B) Carbon quality

    (C) Carbon intensity   (D) Carbon energy

35. The relationship that establishes the behaviour of gases in contact with water is known as

    (A) Bailey's law   (B) Henry's law

    (C) Horton's law   (D) Charle's law

36. The ratio of oxidized materials to reduced materials in a system is called

    (A) Oxidation potential   (B) Reduction potential

    (C) Redox potential   (D) None of these

37. During the oxidation process involving aerobic organisms, which of the following is a hydrogen acceptor ?

    (A) CO_2 (B) SO_4

    (C) NO_3 (D) O_2

38. The methane formation is not expected at Redox potential higher than

    (A) –100 mv   (B) –150 mv

    (C) –200 mv   (D) None of these

Space For Rough Work

39. The growth of methanogenic bacteria in sludges from domestic waste waters normally inhibited at pH values less than_____

(A) 4.0   (B) 6.5

(C) 8.0   (D) 10.0

40. The light penetration in an algal suspension can be approximated by

(A) Henry's law   (B) Charle's law

(C) Beer-Lambert's law   (D) None of these

41. The total quantity of algae present in a body of water at a given time is known as

(A) Primary productivity   (B) Standing crop

(C) Algal density   (D) Algal quality

42. The tidal mixing co-efficient E includes the effect of tidal phenomenon as well as the effects of

(A) Turbulence   (B) Velocity gradient

(C) Density currents   (D) All the above

43. The air temperature decreases with increase in altitude resulting from changes in pressure is referred to as

(A) Environmental lapse rate   (B) Adiabatic lapse rate

(C) Lapse rate   (D) None of these

44. The record of repeated observations made at a particular location in the environment is called

(A) Observations   (B) Polynomial series

(C) Time series   (D) None of these

Space For Rough Work

45. The Hazen – William's equation was originally derived for turbulent flow in

(A) Pipes   (B) Channels

(C) Open channels   (D) All the above

46. Storm water drains are generally designed for a minimum velocity of

(A) 1 m/s   (B) 3 m/s

(C) 2.5 m/s   (D) 0.5 m/s

47. The filter sand for Rapid sand filter should have uniformity coefficient ranging between

(A) 1.3 to 2.2   (B) 1.35 to 1.75

(C) 1.8 to 2.5   (D) 2 to 2.5

48. Hydraulic Coefficient of an orifice meter means the Coefficient of

(A) Velocity   (B) Contraction

(C) Discharge   (D) All of these

49. When water flows over a rectangular suppressed weir the negative pressure created beneath the nappe

(A) increases discharge   (B) decreases the discharge

(C) does not affect the discharge   (D) none of these

50. Cippoletti weir is a _____ weir.

(A) Rectangular   (B) Trapezoidal

(C) Triangular   (D) None of these

Space For Rough Work

PART - 2

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

51. A pipe line of 1000 m long is discharging at a velocity of 1.962 m/s at lower end. If the valve at the discharging end is closed in 20 seconds. The pressure rise in the pipe is

   (A) 5 m   (B) 10 m

   (C) 15 m   (D) 20 m

52. A 15 HP pump with 80% efficiency discharges water to an overhead tank against a total head of 18 m, neglecting losses, the discharge is

   (A) 40 LPS   (B) 45 LPS

   (C) 50 LPS   (D) 55 LPS

53. Chlorine demand of water sample is found to be 0.2 mg/L, then the amount of bleaching powder containing 30% available chlorine, to be added to treat 1 litre of such water is

   (A) 0.06 mg   (B) 0.67 mg

   (C) 1.33 mg   (D) 1.44 mg

54. In a sedimentation tank of dimension 20 m × 100 m × 3 m & flow rates of 600 m^3/day then the detention time will be

   (A) 6 hrs   (B) 4 hrs

   (C) 2 hrs   (D) 8 hrs

55. The relationship between manning's coefficient 'n' & Chezy's coefficient is given by

   (A) $C = R^{2/3}/n$ (B) $C = R^{1/6}/n$

   (C) $C = R^{1/3}/n$ (D) $C = R^{1/4}/n$

Space For Rough Work

56. A vertical triangular area with vertex downward & altitude 'h' has its base lying on the free surface of a liquid. The centre of pressure below the free surface is at a distance of

(A) h/4

(B) h/3

(C) h/2

(D) 2h/3

57. If the chemical is conservative then the mass balance is given by

(A) Accumulation = inputs – outflows

(B) Accumulation = inputs – outflows ± reactions

(C) Accumulation = outflows – reactions

(D) Accumulation = inputs – reactions

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

(A) 1/day

(B) 2/day

(C) 3/day

(D) 4/day

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

(A) $D_c = k_2/k \, (l_0 \, e^{-ktc})$

(B) $D_c = k/k_2 \, (l_0 \, e^{-ktc})$

(C) $D_c = kk_2 \, (l_0 \, e^{-ktc})$

(D) $D_c = k/k_2 \, (l_0 \, e^{-kr})$

60. The effluent containing chloride concentration of 4000 mg/L is discharge from to a stream. The upstream concentration (background) of chloride is 40 mg/L. If the effluent flow is 100 m³/day & stream flow is 1500 m³/day. What is the resulting chloride concentration in the mixed stream at confluence point ?

(A) 200.5 mg/L

(B) 365.5 mg/L

(C) 437.5 mg/L

(D) 540 .5 mg/L

Space For Rough Work

61. The hydrogen ion concentrates in Tomato Juice having pH 4.1 is

(A) 7.94×10^{-5} Mol/L

(B) 8.64×10^{-4} Mol/L

(C) 1.25×10^{-9} Mol/L

(D) None of the above

62. The height of the stack for DG set is determined according to the formula

(A) $H = h + 0.2 (KVA)^{1/3}$

(B) $H = h + 0.4 (KVA)^{3/4}$

(C) $H = h + 0.2 (KVA)^{1/2}$

(D) None of these

63. The pipe factor r in pipe network analysis is given by

(A) $r = fl/12.4 \, d^2$

(B) $r = fl/12.1 \, d^5$

(C) $r = flv^2/2g$

(D) $r = fl/12 \, d^2$

64. For exerting a pressure of 4.8 kg/cm^2, the depth of oil of specific gravity 0.8 should be

(A) 40 m

(B) 41 m

(C) 60 m

(D) 76 m

65. A catchment of 20.000 m^2 has runoff coefficient 0.4 and received rainfall at an uniform rate of 5 mm/hour. What is the maximum rate of runoff ?

(A) 0.011 m^3/s

(B) 2 m^3/s

(C) 2.5 m^3/s

(D) 1.4 m^3/s

Space For Rough Work

66. If the hardness of water is 1 meq/L its equivalent concentration in mg/L as $CaCO_3$ is

(A) 150 mg/L

(B) 50 mg /L

(C) 100 mg /L

(D) 250 mg /L

67. In an unconfined aquifer having coefficient of permeability (k) 5×10^{-2} cm/s and slope of draw down curve (s) 0.2, what is the velocity of water entering the well dug through the aquifer ?

(A) 1×10^{-4} m/s

(B) 2×10^{-3} m/s

(C) 2×10^{-4} m/s

(D) 1×10^{-3} m/s

68. A confined aquifer 20.0 m thick has two monitoring wells spaced at 500 m aport and difference in water level in the wells I 2.0 m, the hydrolic conductivity is 50 m/day, the rate of flow /m of distance perpendicular to the flow is

(A) 4.0 m^3/day

(B) 6.0 m^3/day

(C) 8.0 m^3/day

(D) 9.0 m^3/day

69. In a five day BOD test run for waste water gives BOD_5 of 200 mg/L and the ultimate BOD is 300 mg/L, then the BOD reaction rate constant k (base e) is

(A) 0.22 /day

(B) 0.12 /day

(C) 0.15 /day

(D) 0.21/day

70. An Air quality survey yields Nitrogen dioxide concentration as 470 μg/m^3 at 25 °C temperature and at 1 atm. pressure. NO_2 concentration in ppm is

(A) 0.5 ppm

(B) 0.2 ppm

(C) 0.25 ppm

(D) 0.8 ppm

Space For Rough Work

71. An anemometer at a height of 10 m above the ground measures the wing speed at 2.5 m/s , the wind speed at an elevation of 300 m in rough terrain for atmospheric stability class C with exponent $p = 0.2$, is - - - - - -

(A) 5 m/s

(B) 6 m/s

(C) 4.9 m/s

(D) 9 m/s

72. What should be the diameter of an open well to give safe yield of 4.8 litres/s, assuming a working head as 3.75 m & subsoil consists of fine sand with $C = 0.5$/hour ?

(A) 2.5 m

(B) 1.4 m

(C) 3.4 m

(D) 4.6 m

73. What is the increase in discharge, if an additional pipe of same diameter is introduced parallel to the main pipe ?

(A) 0%

(B) 33%

(C) 41%

(D) 67%

74. The municipal solid waste (MSW) has a moisture content of around 20% & 6% of the dry mass of MSW is hydrogen. Then what is the total energy lost in vapourized water ?

(A) 1540 kJ

(B) 1500 kJ

(C) 1440 kJ

(D) 1600 kJ

75. A town has a population of 50,000 and its waste water to be disposed of by land treatment, if per capita assured water supply is at a rate of 125LPD, the land used for disposal can absorb 100 m^3 of waste water per hectare. The minimum land area required is

(A) 50 hectares

(B) 40 hectares

(C) 55 hectares

(D) 48 hectares

Space For Rough Work

A-4