ACFAGE

Register No.

2018

AGRICULTURAL ENGINEERING

Duration : 3 Hours

Max. Marks : 300

General Instructions to the Applicants :

i) This Question Paper is descriptive type in Degree Standard.

ii) There is no reservation of marks for neatness of execution and correctness of spelling in respect of this paper.

AGRICULTURAL ENGINEERING

PART — A

Note : i) Answer **not exceeding 50 words** each.

ii) Each question carries **three marks.**

iii) Answer any **thirty** questions only out of **thirty five** Questions.

(30 × 3 = 90)

1. For a well yield of 900 lpm a 20 cm well is recommended. The screen may be located in the aquifer which lies between depths 36 – 45 m. The thickness of the aquifer is 9 m, which has a grain size mostly in the range 0.6 – 2 mm and is classified as coarse sand as per IS scale the aquifer is confined. What is the screen length required?

2. Describe Louver – type of well screens with neat sketch.

3. What are the criteria to be followed while selecting a well screen?

4. Differentiate between contour bund and graded bund.

5. Discuss briefly the steps involved in the design of contour bund with a neat sketch.

6. Discuss briefly the purpose of adoption of side bunds and lateral bunds with a neat sketch.

7. Discuss briefly the types of bench terraces with neat sketches.

8. Discuss briefly about the prioritization and ranking of problems in participatory rural appraisal.

9. Discuss briefly the delineation and mapping of watersheds.

10. What are the basic requirements of the base map of a watershed?

11. What is a type–III drain?

12. What is an irrigation gun?

13. What are the sources of calcium and magnesium in water?

14. Write a short note on lining canals with low density poly ethylene film.

15. Write down the use of each of the component listed below for a drop spill way.

    (a) Check gate

    (b) Stilling basin

    (c) Cutoff wall.

16. What do you understand from the terms Kankar lime and Surkhi? Why Kankar lime and Surkhi are added in cement concrete lining?

17. Enumerate the functions of engine oil.

18. List the advantages of air cooled engine.

19. Explain the functioning of a oil bath air cleaner.

20. Define a harrow and enumerate several types of harrow.

21. How the disc harrows are classified depending upon disc arrangements and brief.

22. Enumerate the adjustments for obtaining higher penetration of disc harrow.

23. How to improve the performance of screen cleaner?

24. Describe the principle of magnetic separator.

25. How the colour separator functions?

26. Distinguish between Rittinger's and Kicks law.

27. Mention the types of mixing equipments.

28. What are the methods of pasteurization?

29. What are all the factors involved in deciding optimum size of biogas plant?

30. How a newly constructed biogas plant is commissioned?

31. What are all the factors one should consider before selecting the site for a biogas plant construction?

32. Write about wet and dry fermentation in biogas production.

33. Mention the factors needed to produce commercial sterility.

34. How does the Engleberg huller works?

35. Write short notes on Acme harrow and Guntaka.

PART — B

Note : i) Answer **not exceeding 100 words** each.

ii) Each question carries **eight marks**.

iii) Answer any **fifteen** questions only out of **eighteen** Questions.

(15 × 8 = 120)

36. A 30 cm well fully penetrates a confined aquifer 30 m deep. After a long period of pumping at a rate of 1200 lpm, the drawdowns in the wells at 20 and 45 m from the pumping well are found to be 2.2 and 1.8 m, respectively. Determine the transmissibility of the aquifer? What is the drawdown in the pumped well?

37. A well 3 m diameter has a normal water level of 3 m b.g.l. By pumping the water level in the well is depressed to 9 m b.g.l. In a time interval of 4 hrs, the water level rises by 4.5 m. Determine the specific yield of the well. What is the safe yield of the well if the working depression head is 3.5 m?

38. Discuss in details the types of water erosion and its mechanics.

39. Discuss in detail the measures to control soil erosion by wind.

40. Discuss the social and institutional issues in watershed management.

41. Discuss in detail the basic components of remote sensing data collection with a neat diagram (layout).

42. Furrows 50 m long and spaced 75 cm apart are irrigated by an initial furrow stream of 100 lpm. The initial furrow stream reached the lower end of the field in 40 min. The size of the stream was then reduced to 30 lpm. The cut back stream continued for 1 hr. What is the average depth of irrigation?

43. A 30 cm well is pumped at the rate of 1000 lpm. The transmittivity of the aquifer is 0.015 m^2/S. If the well is located at a distance of 120 m from a stream, what should be the drawdown?

(a) In a pumping well?

(b) In an observation well 80 m away from the pumping well on the side opposite to the stream.

(c) In an observation well 80 m away from the pumping well on a line parallel to the stream.

44. What are the advantages of lining irrigation canals? List out atleast three methods of lining of canals.

45. Find out the carrying capacity in cubic metres per second of a rectangular channel of depth 30 cm and width 56 cm respectively. The slope of the channel is 0.02 percent. The Manning's roughness coefficient for the channel is 0.015.

46. Differentiate between diesel engine and petrol engine.

47. Explain the valve timing diagram of a four stroke engine.

48. Differentiate between spring tyne cultivator with rigid tyne cultivator.

49. What are all the functions of a seed drill and explain the components of a seed drill?

50. Calculate the settling velocity of dust particles of 60 μm and 10 μm diameter in air at 21 °C and 100 kPa pressure. The particles are spherical with a density of 1280 kg/m^3.

Viscosity of air = 1.8×10^{-5} $Ns\,m^{-2}$ Density of air =1.2 kg/m^3.

51. Write the material and enthalpy balance for single effect evaporator and brief them.

52. Explain the mechanical drying methods used for drying of agricultural products.

53. Explain the working principle of LSU dryer.

PART — C

Note : i) Answer **not exceeding 200 words** each.

ii) Each question carries **fifteen marks**.

iii) Answer any **six** questions only out of **nine** questions.

(6 × 15 = 90)

54. Explain the methods adopted for well development.

55. Discuss in detail the initiation of soil movement by wind including the types of soil particle movement.

56. Discuss in detail the various steps required in participatory rural appraisal.

57. Explain with neat sketches about the different types of poultry houses.

58. What is the status of farm mechanization in India and elaborate the emerging trends in farm mechanization?

59. Explain the construction and working principles of a tractor drawn mould board plough.

60. Tomato juice is to be concentrated from 12% to 28% solids in a climbing film evaporator, 3 m high and 4 cm diameter. The maximum allowable temperature for tomato is 57 °C with the latent of 2366 kJ/kg steam is used at 170 kPa (gauge). The overall heat transfer coefficient is 6000 J/m² SC. Estimate the quantity of tomato juice fed/hour. Taking heating surface as 3m × 0.04m dia. (Take 100 kg basis with steam temperature as 115 °C)

61. What are the direct methods used for determining moisture content of food materials and explain them.

62. How ethanol is produced from different feedstocks?