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# TNPSC ACF

## Previous Year Paper
### (Electronics Engineering)
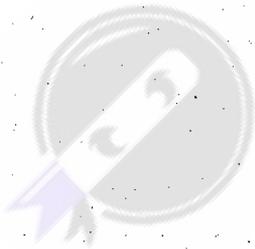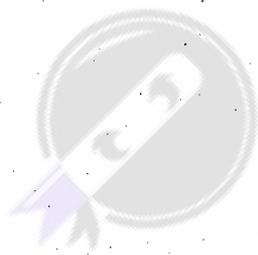### 2018

# ACFENE

# 2018

# ELECTRONICS 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.

# ELECTRONICS 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.

$(30 \times 3 = 90)$

1.  What are semiconductors? Indicate the method of classification of semiconductors.

2.  Explain Intrinsic and Extrinsic semiconductors with examples.

3.  List the applications of a semiconductor in modern electronic circuits.

4.  What are opto electronic devices? Explain about the classification involved.

5.  Differentiate between continuous and discrete time signal. Give an example for each of them.

6.  State Fourier Transform pair for continuous time aperiodic signal.

7.  Consider a causal LTI system with frequency response $H(jw) = \dfrac{1}{3 + jw}$. For a particular input $x(t)$ this system is observed to produce the output $y(t) = e^{-3t} u(t) - e^{-4t} u(t)$. Determine $x(t)$.

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8. Let $X(F) = 4 - 2\,e^{-j4\pi F}$. If $y(n) = x(n-2)$. Find $Y(F)$ and compute $Y(F)$ at $F = 0.2$.

9. What is an Amplifier? Indicate how the transistor amplifier is classified based on i/p and transistor configuration.

10. Write the advantages and disadvantages of impedance coupled amplifiers.

11. Mention about the applications of OP-AMP.

12. Draw the damped and undamped curves of an oscillator.

13. State Biot-Savarts law.

14. Compute divergence of the vector $\overline{F} = x^2\,\overline{i} + 2\,\overline{j} + y\,z\,\overline{k}$ at that point $(1, 1, 1)$.

15. State Stoke's theorem.

16. A plane electromagnetic wave is propagating through free space with a peak value of $E = 100\ \text{V/m}$. Find the corresponding value of H.

17. State the principle of operation of a Rake receiver.

18. Mention the key process of Laser action.

19. What is MAHO and state in which generation mobile communication systems it is used?

20. When is Doppler shift positive and negative in a mobile communication system?

21. What is the effect of windowing in the design of FIR filters?

22. What is meant by zero-input limit cycle oscillations?

23. Histograms are popular tool for real time Image Processing. Justify.

24. What do Mach bands indicate?

25. List some of the techniques used for addition in VLSI design.

26. Draw a circuit to compute $F = \overline{AB + CD}$ using CMOS devices.

27. State the advantages of modified booth multiplier.

28. Show how to design a low power circuit using ARM processor?

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29. Give the control signals associated with data transfer in memory.

30. List out the methods used for systematic design of hardwired control unit.

31. Mention any three characteristics of RAM.

32. Give any three postulates used to formulate various algebraic structures.

33. Consider a causal LTI system whose input $x(n)$ and output $y(n)$ are related through the block diagram representation as shown in the following figure.
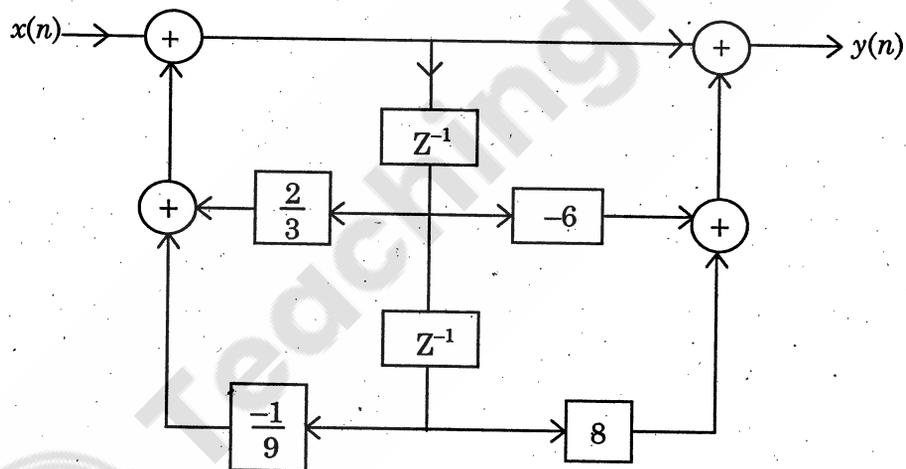


Determine difference equation.

34. If the clock frequency is 5 MHz, how much time is required to execute an instruction of 18 T-states?

35. What is the need for anti-imaging filter after upsampling a signal?

# 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.
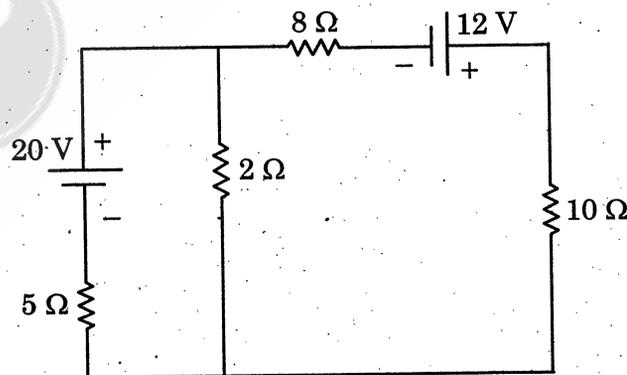
$(15 \times 8 = 120)$

36.    State and prove the following properties of Laplace Transform.
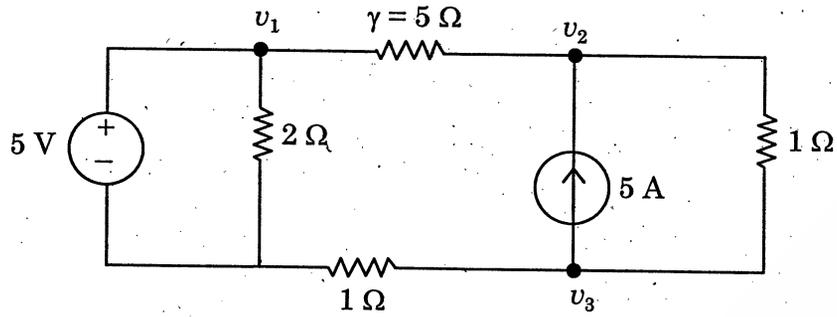
(a)    Differentiation

(b)    Integration.

37.    Compare Transistor and Thyristor.

38.    What is an IC? Write its advantages and disadvantages.

39.    Find the current through the 10 Ω resistance in the circuit shown below. Use Thevenins theorem.

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40.



Determine the current through $\gamma = 5\,\Omega$ resistor using nodal method.

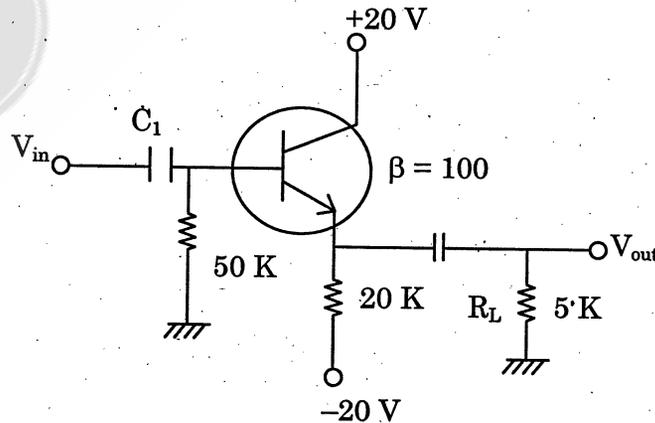41. Draw the circuit diagram of a CB amplifier and explain its working.

42. For the CC amplifier in the circuit, compute

(a) $r'_{in}$

(b) $r'_0$

(c) $A_V$ and $A_P$.

Take transistor $\beta = 100$, Neglect $V_{BE}$ and use $r_e = 25\,mV/BE$

43. Apply ampere's circuital law to calculate magnetic field intensity inside a current carrying toroid.

44. Calculate the length of the half wave dipole antenna meant to have correct half-wave length at 80 MHz whose Q is 40. Also calculate bandwidth.

45. Compute the DFT of a sequence $(-1)^n$ for $N = 4$.

46. Show that the up sampler and down sampler are time variant systems.

47. Describe practical handoff considerations.

48. Draw the block diagram of a setup for measuring VSWR and explain the step by step procedure.

49. Explain with an example how booth encoding is used to accelerate serial multiplication.

50. Outline the problems in modeling the processing of instructions in a multiprocessor system.

51. Draw the logic gate circuit diagram for the Boolean expression $F(x, y, z) = x' y + y' z$ with the help of NOR gates.

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52. Implement the following Boolean functions with NAND gates $f(x, y, z) = (1, 2, 3, 4, 5, 7)$.

53. What is an energy band diagram? Draw and explain the same for insulators, conductors and semiconductors.

# 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.

$(6 \times 15 = 90)$

54. Find the current through the $5\,\Omega$ resistor in the circuit shown below using super position theorem.
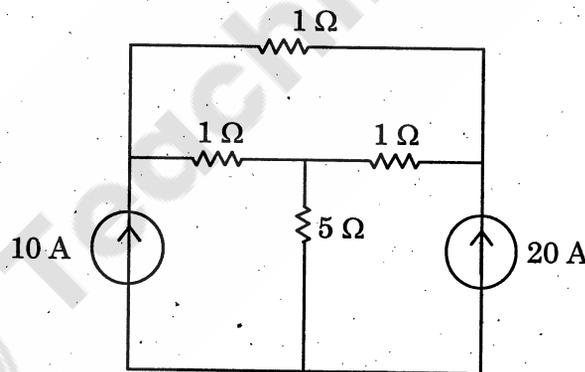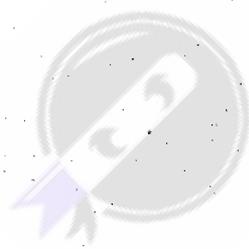


and verify the result by using node analysis method.

55. Discuss in detail about the antenna parameters.

56. Give the conversion formulas from RGB to HSI model and vice-versa in image processing applications.

57. Explain the concepts of trunking and grade of service.

58. What are Active filters? Explain about any two type of Active filter.

59. What are Rectifiers? Explain the working principle of any two rectifier circuits.

60. Draw the internal block diagram of 8086 microprocessor and explain the various blocks.

61. Explain the features of the different Input / Output ports of 8051 microcontroller.

62. Design a Butterworth filter using the

    (a) Impulse

    (b) Bilinear transformation

    in variance method for the following specifications.

    $$0.8 \leq \left| H(e^{jw}) \right| \leq 1 \quad 0 \leq w \leq 0.2\pi$$
    $$\left| H(e^{jw}) \right| \leq 0.2 \quad 0.6\pi \leq w \leq \pi$$