THE GATE ACADEMY
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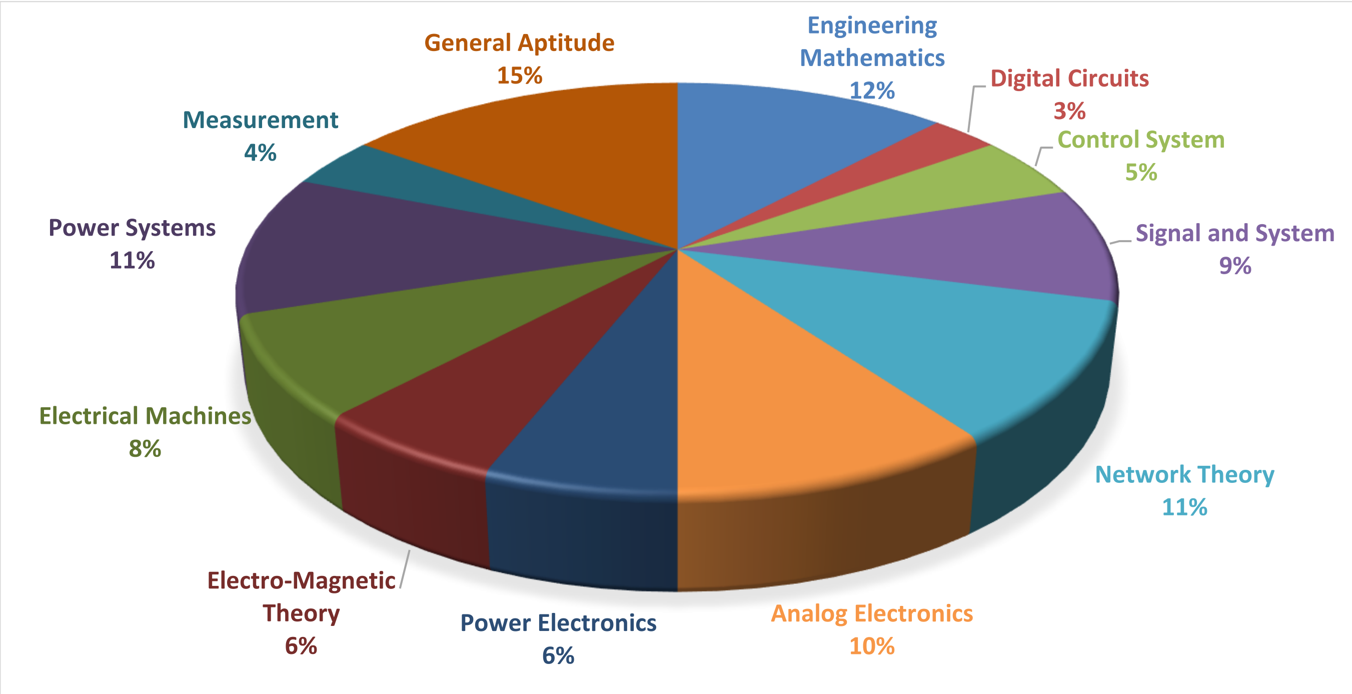
EE

ANALYSIS OF GATE 2021

Memory Based

Electrical Engineering



EE ANALYSIS-2021_Feb-7_Morning

SUBJECT	No. of Ques.	Topics Asked in Paper (Memory Based)	Level of Ques.	Total Marks
Engineering Mathematics	1 Marks: 4 2 Marks: 4	Complex variable, probability, Eigen Values,	Easy to moderate	12
Digital Circuits	1 Marks: 1 2 Marks: 1	Sequential circuit, Counter, grey code	Medium	3
Control System	1 Marks: 1 2 Marks: 2	Bode plot, ESE, space analysis, damping frequency,	Medium	5
Signal and System	1 Marks: 2 2 Marks: 3	Fourier transform, Z- transform, types of system,	Medium	9
Network Theory	1 Marks: 3 2 Marks: 4	Transient, Thevenin's theorem, maximum power transfer theory,	Easy	11
Analog Electronics	1 Marks: 4 2 Marks: 3	BJT, Zener diode,		10
Power Electronics	1 Marks: 0 2 Marks: 3	Buck booster converter	Medium	6
Electro-Magnetic Theory	1 Marks: 2 2 Marks: 2	Magnetic flux density,	Easy	6
Electrical Machines	1 Marks: 2 2 Marks: 3	Signal phase transformer, induction motor, DC-generator	Medium	8
Power Systems	1 Marks: 3 2 Marks: 4	Load flow analysis	Difficult	11
Measurement	1 Marks: 2 2 Marks: 1	Bridges	Easy	4
General Aptitude	1 Marks: 5 2 Marks: 5	Geometry, Arrangement, spatial reasoning, remainder theorem	Easy	15
Total	**65**			**100**
Faculty Feedback	MCQ-24, 31-NAT Questions, No MSQ Questions. Overall Difficulty Level of Exam **Moderate**			

GATE 2021 Examination* (Memory Based)

Electrical Engineering

Test Date: 7th Feb 2021

Test Time: 09:30 am to 12:30 pm

Stream Name: Electrical Engineering

General Aptitude

Q.1 – Q.5 Carry One Mark each.

1. Rectangular polygon having 10 sides⇒ Interior Angle between sides of polygon in degree is
(A) 216
(B) 396
(C) 144
(D) 324
[Ans. *]

2. 7 Cars P, Q, R, S, T, U and V are parked in row not necessarily in that order. The cars T and U should be parked next to each other. The cars S and V also should be parked next to each other. Whereas P and Q can't be parked next to each other. Q and S must be parked next to each other. R is parked to the immediate right of V. T is parked to the left of U. Choose incorrect option.
(A) There are 2 cars parked in between Q and V
(B) V is the only car parked in between S and R
(C) P is parked at extreme end
(D) Q and R are not parked together.
[Ans. *]

3. The people ________ were at demonstration were from all sections of society.
(A) whom
(B) who
(C) which
(D) whose
[Ans. *]

4. Oasis is to sand as island is to ________.
Identify similar logical relation
(A) Mountain
(B) Stone
(C) Land
(D) Water
[Ans. *]

5. Students who pass the exam can't appear for the exam again. Students who fail the exam in 1st attempt must appear for the exam in the following year. Students always pass the exam in their 2nd attempt. Number of students who took the exam for the first time in year 2 and year 3 respectively are

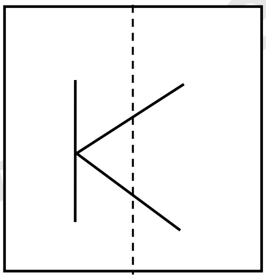
Year	Pass	Fail
Year 1	50	10
Year 2	60	5
Year 3	50	3

(A) 65 and 53
(B) 60 and 50
(C) 55 and 48
(D) 59 and 53
[Ans. *]

Q.6 – Q.10 Carry Two Mark each.

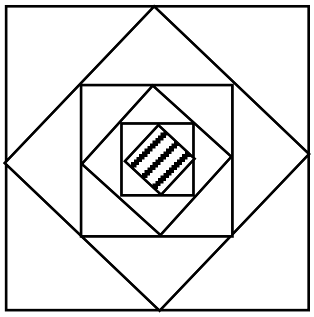
6. Which of the following numbers is exactly divisible by $(11^{13} + 1)$?
(A) $11^{33} + 1$
(B) $11^{52} + 1$
(C) $11^{26} + 1$
(D) $11^{29} + 1$
[Ans. *]

7. The triangle square sheet shown is folded along the dotted line. The folded sheet will look like



[Ans. *]

8. Area of smallest square (shaded) is



(A) 1.5625
(B) 6.25
(C) 12.50
(D) 3.125
[Ans. *]

9. X is a continuous random variable denoting the temperature measured. Range of Temperature is [0, 100] degree Celsius and Let the probability density function of X be $F(x) = 0.01$ for $0 \leq X \leq 100$. Mean of X is ________.
(A) 50
(B) 2.5
(C) 5
(D) 25
[Ans. *]

10. A

Technical

Q.1 - Q.25 Carry One Mark each.

1. Let p and q be real numbers such that $p^2 + q^2 = 1$. The given value of the matrix $\begin{bmatrix} p & q \\ q & -p \end{bmatrix}$ are

(A) j and $-j$
(B) 1 and -1
(C) pq and $-$pq
(D) 1 and 1
[Ans. *]

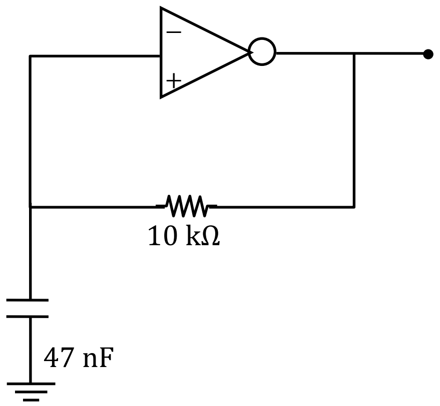
2. f(x) real valued $f^n, f'(x_0) = 0$ for some $x_0 \in (0,1), f''(x) > 0$ for all $x \in (0,1)$, Then f(x) has
(A) exactly one local minima in (0,1)
(B) One local maxima (0, 1)
(C) 2 distinct local minima in (0,1)
(D) No local minimum in (0,1)
[Ans. *]

3. Suppose circles $x^2 + y^2 = 1$ and $(x-1)^2 + (y-1)^2 = r^2$ intersect each other orthogonally at the point (u, v). Then $u + v =$________.
[Ans. *]

4. Let $P(Z) = z^3 + (1+j)\,Z^2 + (2+j)\,Z + 3$ where Z is a complex number. Which of the following is true?
(A) All the roots can't be real
(B) Sum of roots of $P(Z) = 0$ is real number
(C) The complex root of the equation $P(Z) = 0$ come in conjugate pairs
(D) Conjugate $\{P(Z)\} = P(\text{Conjugate }\{Z\}$ for all Z
[Ans. *]

5. One sub-matrix of the Jacobian matrix J as shown below.
$\begin{bmatrix} \Delta P \\ \Delta Q \end{bmatrix} = J \begin{bmatrix} \Delta\delta \\ \Delta\gamma \end{bmatrix}$, where $J = \begin{bmatrix} N & S \\ M & R \end{bmatrix}$
The dimension of the sub matrix M is
(A) $N_L \times N - 1$
(B) $N_L \times (N - 1 + N_L)$
(C) $(N-1) \times (N - 1 + N_L)$
(D) $(N-1) \times (N - 1 - N_2)$
[Ans. *]

6. A CMOS Schmitt trigger inverter has a low output level of 5V. It has ijp threshold of 1.6 V and 2.4 V. The frequency of the oscillator is ________ Hz. [Neglect input C &



7. A 16-bit syn-binary up counter is clocked with true. The 2 most SB are OR-ed together to form an o/p γ.M/m shows that γ is periodic and duration for which γ remains high in each period is 24m sec. The force is _______Hz.

[Ans. *]

8. In a $1-\phi$ transformer $P_i = 2500$ watts at nominal voltage of 440 volts and frequency at 50Hz the iron -Loss is 850 walts at 220 volts and 25 Hz . Then at nominal voltage and frequency , the P_h P_e loss respectively are :-

(A) 600 walts ,250walts
(B) 250walts;600 walts
(C) 900 walts;1600 walts
(D) 1600 wlats;900 walts

[Ans. *]

9. moved from (0, 10, 0) to (5, 5, 5) to (5, 0, 0).
Calculate the total work done in moving the charge.

10. A 1μ point charge of origin. If a 2nd point charge of 10μC is moved from (0, 10, 0) to (5, 5, 5) and subsequently to (5, 0, 0) the total work done is ________mJ

11. One columns of point charge moving with a uniform velocity 10 $\hat{x}$ m/s enters the region $x \geq 0$ having $\vec{B} = (10y\hat{x} + 10x\hat{y} + 10\hat{z})$T. The magnitude of force on the charge at $x = 0+$ is ________ N.

11. $h_1(n) = S(n-1) + S(n+1), h_2(n) = \delta(n) + \delta(n-1)$ connected in cascade. The impulse response of the cascade system

(A) $S(n-2) + S(n-1) + S(n) + S(n+1)$
(B) $S(n-1)S(n) + S(n+1)S(n-1)$
(C) $\delta(N)\delta(n-01) + \delta(n-2)\delta(n+1)$
(D)

[Ans. *]

12. A

13. A

14. A

15. A

16. A

17. A

18. A

19. A

20. A

Q.26 - Q.55 Carry Two Mark each.

26. Let $(-1-j), (3-j), (3+j)$ and $(-1+j)$ be the vertices of rectangle C in complex plane then $\oint_C \frac{dz}{z^2(z-4)}$ is

(A) 0

(B) $j\frac{\pi}{2}$

(C) $-j\frac{\pi}{8}$

(D) $-j\frac{\pi}{10}$

[Ans. *]

27. Let A be 10×10, such that A^5 is a null matrix and Let I be 10×10. Then $|A+I|$ is ________.

[Ans. *]

28. In open interval (0, 1), the $p(x) = x^4 + 4x^3 + 2$ has

(A) 2 real roots

(B) 1 real roots

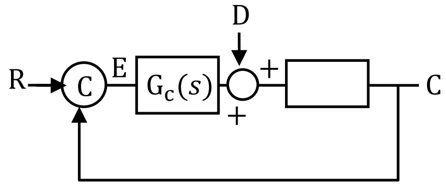
(C) No real roots

(D) 3 real roots

[Ans. *]

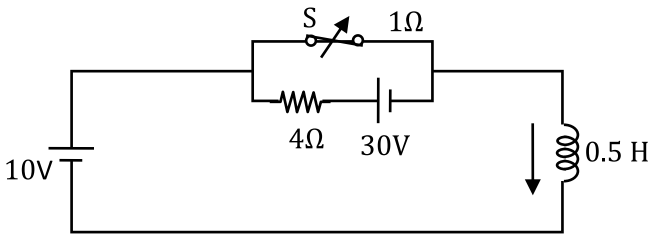
29. $G_p(s) = \frac{2.2}{(1+0.15)(1+0.45)(1+1.25)}$

$G_c(s) = \frac{K(1+T_1 s)}{(1+T_2 s)}$. It is desired the where D(s)is unit step, less $\leq 0.1\ K_{min}$________.

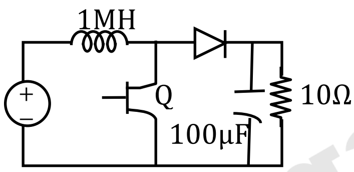


30. $\cdot 8.2e^{-10t} \cdot 10 \cdot 8e^{-10t} \cdot 10(1 - e^{-2t})$

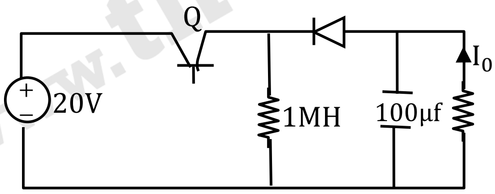
$i_L(t) = ?$



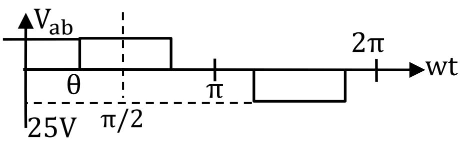
31. $f = 25KhZ$, $d = 0.6$. Under steady stock R_{in} as seen by the source _________ Ω



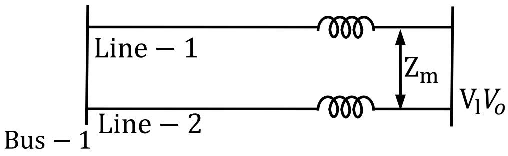
32. $f = 25kHZ, D = 0.75, I_{avg}$ is ________ A



33. symmetric square waveform across 'ab' as shown .To achieve $m_a = 0.8$, the θ in degree ________.



34. in fig $X_S = 1.5$ jPu. each line be $Z_m = 10$. SPU. Given $\delta > 6$, Max^m steady state real power that can be transfers from bus-1 to bus-2



35. Let f(t) be an even function . Let the Fourier transform f(t) be defined as

$$F(\omega) = \int_{-\infty}^{\infty} f(t)e^{-j\omega t}\,dt. \text{ Suppose } \frac{dF(\omega)}{d\omega} = -\omega F(\text{omega }) \text{ for allow and } F(0) = 10 \text{ then}$$

(A) $f(0) >$
(B) $f(0) < 1$
(C) $F(0) = 0$
(D) $f(0) = 1$
[Ans. *]

36. Cascade System $Z^2(z-a)^{-2}$ is
(A) $n^2 a^n x(n)$
(B) $z^{2n} x(n)$
(C) $n^{-1} a^n x(n)$
(D) $(n+1)a^n u(x)$

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