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Answer Key Ph.D. Entrance Examination of Electrical Engineering

Question Number	Answer	Question Number	Answer
Q1	d	Q21	b
Q2	a	Q22	c
Q3	a	Q23	b
Q4	d	Q24	c
Q5	b	Q25	d
Q6	b	Q26	c
Q7	a	Q27	d
Q8	b	Q28	c
Q9	c	Q29	c
Q10	d	Q30	b
Q11	d	Q31	a
Q12	b	Q32	a
Q13	a	Q33	c
Q14	c	Q34	b
Q15	a	Q35	c
Q16	d	Q36	b
Q17	c	Q37	a
Q18	a	Q38	a
Q19	c	Q39	d
Q20	c	Q40	b

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Q1. When the thyristor gets turned on, the gate drive
a) should not be removed as it will turn off the SCR
b) may or may not be removed
c) should be removed
d) should be removed to avoid increased losses and higher junction temperature.

Q2. In actual practice, the string efficiency is improved by using
a) capacitance grading
b) grading ring
c) discs of different sizes
d) any of the above

Q3. Which of the 3 bipolar transistor configurations provides the best power gain
a) in CE b) in CB
c) in CC d) any one of the above.

Q4. A single-phase full wave mid- point thyristor converter uses a 230/200 V transformer with center tap on the secondary side. The PIV per thyristor is
a) 100 V b) 141.4 V
c) 200 V d) 282.8 V

Q5. The bridge used for the measurement of high Q inductance is the
a) Anderson's bridge
b) Hay's bridge
c) Wein's bridge
d) Maxwell's bridge

Q6. The insulation resistance of a 2 km long cable is 150 MΩ. For a length of 20 km, the insulation resistance will be
a) 1500 MΩ b) 15 MΩ
c) 300 MΩ d) 150 MΩ

Q7. A single-phase bridge inverter delivers power to a series connected RLC load with R= 2 Ω, ωL= 8 Ω. For this inverter load combination, load commutation is possible in case the magnitude of 1/ ωC in ohms is
a) 10 b) 8
c) 6 d) zero

Q8. The nominal ratio in the current transformer is
a) Primary winding current/ secondary winding current
b) Rated primary winding current/ rated secondary winding current
c) Number of secondary winding turns/ number of primary winding turns
d) all of the above

Q9. In a three-phase full converter, 6 SCRs are fired at an interval of
a) 0°
b) 60°
c) 120°
d) 180°

Q10. An unbalanced vector system can be resolved into components known as
a) positive phase sequence components
b) negative phase sequence components
c) zero phase sequence components
d) all the above

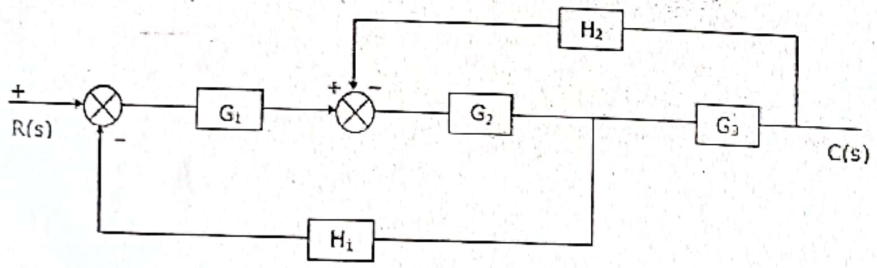
Q11. For fast load flow calculations, the best method is
a) Gauss Seidel method
b) Newton Raphson method in rectangular coordinates
c) Newton Raphson method in polar coordinates
d) De-coupled method

Q12. In a load flow studies a PV bus is treated as a PQ bus when
a) voltage at the bus becomes high
b) reactive power goes beyond limit
c) phase angle becomes high
d) any of the above

Q13. The transfer function of the system described by $\frac{d^2y}{dt^2}+\frac{dy}{dt}=\frac{du}{dt}+2u$ with u as input and y as output is
a) $\frac{(s+2)}{(s^2+s)}$
b) $\frac{(s+1)}{(s^2+s)}$
c) $\frac{2}{(s^2+s)}$
d) $\frac{2s}{(s^2+s)}$

Q14. Energy stored in the capacitor over a cycle, when excited by an AC source is
a) the same as that due to a DC source of equivalent magnitude
b) half of that due to a DC source of equivalent magnitude
c) zero
d) none of the above

Q15. For the block diagram shown in Figure C(s)/R(s) is given by



a) $\frac{G_1G_2G_3}{1+H_2G_2G_3+H_1G_1G_2}$
b) $\frac{G_1G_2G_3}{1+H_1H_2G_1G_2G_3}$
c) $\frac{G_1G_2G_3}{1+H_1G_1G_2G_3+H_2G_3G_1G_2}$
d) $\frac{G_1G_2G_3}{1+H_1G_1G_2G_3}$

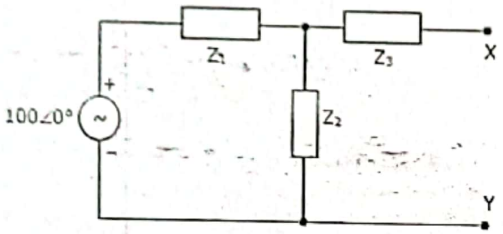
Q16._A series R-L-C circuit when excited by a 10V sinusoidal voltage source of variable frequency, exhibits resonance at 100 Hz and has a 3dB bandwidth of 5 Hz. The voltage across the inductor L at resonance is

a) 10 V
b) $10\sqrt{2}\,V$
c) $\frac{10}{\sqrt{2}}\,V$
d) 200 V

Q17. Feedback control systems are

a) insensitive to both forward and feedback path parameter changes
b) less sensitive to feedback path parameter changes than to forward path parameter changes
c) less sensitive to forward path parameter changes than to feedback path parameter changes
d) equally sensitive to forward and feedback path parameter changes.

Q18. In the figure, $z_1 = 10 < -60°, z_2 = 50 < 53.13°$. Thevenin impedance seen from X-Y is



a) $56.66 < 45°$
b) $60 < 30°$
c) $70 < 30°$
d) $34.4 < 65°$

Q19._The number of roots on the equation $2s^4 + s^3 + 3s^2 + 5s + 7 = 0$ that in lie in the right half of s-plane is

a) zero b) one
c) two d) three

Q 20._ A passive two-port network is in a steady state. Compared to its input, the steady output can never offer

a) higher voltage
b) lower impedance
c) greater power
d) better regulation

Q21. A major advantage of active filters is that they can be realized without using

a) op-amps b) inductors
c) resistors d) capacitors

Q22. Which of the following is true?

a) A finite amplitude signal is always time-bounded
b) A time-bounded signal always possesses finite energy
c) A time-bounded signal is always zero outside the interval $[-t_0, t_0]$ for some t_0.
d) Time-bounded signal is always finite in amplitude.

Q23. A cascade of 3 linear time-invariant systems is causal and unstable.
From this, it is concluded that
a) each system in the cascade is individually causal and unstable
b) at least one system is unstable and at least one system is causal
c) at least one system is causal and all systems are unstable
d) the majority are unstable and the majority are causal.

Q24. If an AC voltage wave is corrupted with an arbitrary number of harmonics, then the overall voltage waveform differs from its fundamental frequency component in terms of
a) only the peak values
b) only the rms values
c) peak and rms values
d) all the three measures (peak, rms and average values)

Q25. A current impulse of $5\delta(t)$,is forced through a capacitor C. The voltage $V_c(t)$, across the capacitor is given by
a) 5t
b) 5u(t)-C
c) $\frac{5}{C}t$
d) $\frac{5u(t)}{C}$

Q26. A 2- pole generator with wave wound armature has 51 slots each having 24 conductors. The flux per pole is 0.01 wb. The speed at which the generator should be run to induce the voltage of 220 should be
a) 539 rpm
b) 750 rpm
c) 1078 rpm
d) 1440 rpm

Q27. The resistance of a DC motor is usually
a) infinitely large
b) very large
c) around 100 ohms
d) low.

Q28. A transformer can have zero voltage regulation at
a) zero power factor
b) lagging power factor
c) leading power factor
d) unity power factor

Q29. An alternator is supplying 10 A to an inductive load at 220 V, while running at 1000 rpm. Now, if the speed of the alternator is reduced to 750 rpm but field current remains unchanged, the load current will become
a) 18 A
b) 13.3 A
c) 10 A
d) 7.5 A

Q30. The starting torque of three-phase induction motor can be increased by
a) increasing the rotor reactance
b) increasing the rotor resistance
c) reducing the rotor resistance
d) increasing the stator resistance

Q31. Which motor will not be suitable for constant speed variable load operation?
a) repulsion type
b) synchronous type
c) slip ring type
d) all of the above

Q32. Which oscillator incorporates two inter-dependent circuits in such a way that the output of each controls the input of the other?

a) relaxation oscillator
b) feedback oscillator
c) low impedance oscillator
d) sine wave oscillator

Q33. The main factor in favour of the use of aluminium as bus bar material is

a) its low melting point
b) its high resistivity
c) its low cost
d) its low density

Q34. The poynting vector is associated with

a) flux in magnetic field
b) power flow in electrostatic field
c) current in electrostatic field
d) charge in electrostatic field

Q35. A time varying magnetic field produces

a) magnetic field only
b) electric field only
c) both electric and magnetic fields
d) magnetic, electric and thermal fields.

Q36. The determinant of a matrix whose eigenvalues are 7, 1, and 9 is given by

a) 7 b) 63
c) 9 d) 17

Q37. Find the value of the definite integral: $\int_0^{\pi/2} Sin\, x \;\; dx$

a) 1 b) 2/3
c) -2 d) 0

Q38. The number of arbitrary constants in the general solution of a differential equation is equal to its

a) order
b) degree
c) linearity
d) homogeneity

Q39. The Laplace Transform of the function $f(t) = e^{at}$ is

a) a / (s - a)
b) 1 / (s + a)
c) s / (s - a)
d) 1 / (s - a)

Q40. In a binomial experiment, the successive trials are

a) dependent
b) independent
c) mutually exclusive
d) fixed