JUNIOR ENGINEER ELECTRICAL ENGINEERING EXAMINATION 2024 (PAPER-III)
(MEMORY BASED)

EXAM DATE	**07/06/2024**
EXAM TIME	**5:00 PM – 7:00 PM**
SUBJECT	**Junior Engineer 2024 Electrical Engineering**

SECTION A : ELECTRICAL ENGINEERING

Q.1. Which of the following is not application of shaded pole motor?

(a) Fans for refrigeration (b) A lift of a building

(c) Table fan (d) Hair direr

Sol. Shaded pole motors have low starting torque, low cost, and low efficiency therfore it is used for light load. According to given question shaded pole motor is not used for lift of a building.

Q.2. Unit of current?

Sol. Ampere.

Q.3. Full form of MOSFET?

Sol. Metal Oxide Semiconductor Field Effect Transistor.

Q.4. Unit of absolute permittivity?

Sol. Farad per meter

Q.5. How to minimize creeping error in energy meter?

Sol. In order to prevent this creeping on no-load two holes or slots are drilled in the disc on opposite sides of the spindle. This causes sufficient distortion of the field; The result is that the disc tends to remain stationary when one of the holes comes under one of the shunt magnets.

Q.6. Which of the following correctly describes mutual inductance formula.

Sol. The mutual inductance M_{21} of coil 2 with respect to coil 1 is the ratio of the flux through the N_2 turns of coil 2 produced by the magnetic field of the current in coil 1, divided by that current, that is,

$$M_{21} = \frac{N_2\phi_{21}}{I_1}$$

Similarly, the mutual inductance of coil 1 with respect to coil 2 is

$$M_{12} = \frac{N_1\phi_{12}}{I_2}$$

Mutual inductance is also given by $M = K\sqrt{L_1L_2}$

Where K is coefficient coupling.

Q.7. Electrical equivalent of solar PV cell?

(a) Inductor (b) Capacitor

(c) Diode (d) Transistor

Sol. **(c)**

Electrical equivalent of solar PV cell is diode.

Q.8. What is the diameter and axial length of hydrogenator.

Sol. In hydro power plant, salient pole generator is used. Therefore, it has large diameter and small axial length.

Q.9. What is the use of boiler in thermal power plant?

Sol. Boiler is used to generate steam.

Q.10. Use of damper winding.

Sol. Damper windings are commonly used in synchronous generators and motors to help control the stability and damping of the system. Here's how they work and why they're used:

1. Damping Oscillations: Damper windings are often placed in the rotor of synchronous machines. When the machine experiences sudden disturbances or changes in load, it can cause oscillations in the rotor. These oscillations can lead to instability and even damage to the machine if not controlled. The damper winding provides a damping effect on these oscillations, helping to stabilize the machine's operation.
2. Improving Transient Stability: During transient events such as sudden changes in load or faults, synchronous machines can experience instability. Damper windings help to mitigate this instability by dissipating the excess energy associated with the transient event. This improves the machine's transient stability and helps maintain system reliability.
3. Reducing Hunting: In synchronous motors, especially those driving large inertial loads, hunting can occur when the motor speed oscillates around the desired speed due to changes in load or system conditions. Damper windings help to dampen these speed oscillations, reducing hunting and improving the motor's performance.
4. Enhancing Synchronizing Capability: Damper windings also play a role in the synchronizing capability of synchronous machines. During synchronization, when connecting a generator to a grid or another generator, the damper windings help to damp out any transient oscillations in speed or phase angle, allowing for smooth synchronization without causing disturbances to the power system.

Q.11. Definition of load factor.

Sol. **Load factor:** The ratio of average load to the maximum demand during a given period is known as the load factor.

Load factor = average load/maximum demand.

Q.12. $V_L = 230$ V

$I_L = 15$ A

$\phi = 30$

Find the value active power.

Sol. $\sqrt{3} \times V_L I_L \cos\phi$

$= \sqrt{3} \times 230 \times 15 \times \cos 30°$

$= \sqrt{3} \times 230 \times 15 \times \sqrt{\frac{3}{2}}$

$= 5{,}175$

Q.13. What is value of A in end condenser method?

Sol. $\begin{bmatrix} 1+yz & z \\ y & 1 \end{bmatrix}$

$A = 1 + yz$

$D = 1$

Q.14. In which region transistor works as OFF switch?

Sol. In cut off region transistor works as OFF switch.

Q.15. If V = $6\angle 45°$ and I = $2\angle 30°$, then what is value of impedance?

Sol. $Z = \frac{V}{I}$

$= \frac{6\angle 45°}{2\angle 30°}$

$= 3\angle 15°$

Q.16. Which configuration is used in medium transmission line analysis.

Sol. Nominal π.

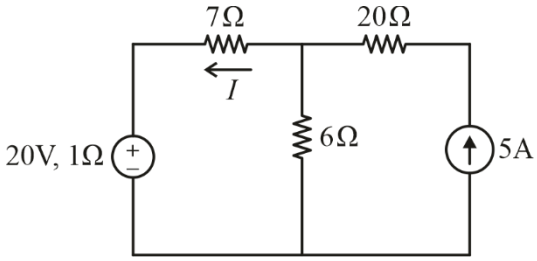
Q.17. In CRO if horizontal intersection is 4 and vertical is 8, then what is the vertical frequency if horizontal frequency 1600 Hz?

Sol. $\frac{f_y}{f_x} = \frac{4}{8}$

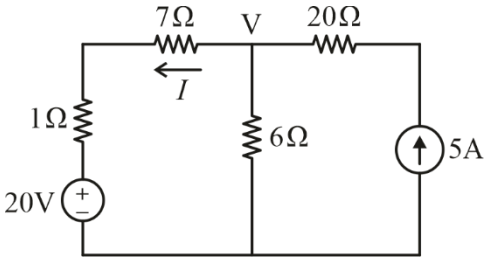
$\frac{f_y}{1600} = \frac{4}{8}$

$f_y = 1600 \times \frac{4}{8} = 800$ Hz.

Q.18. What is the value of current I, If the 20V source having internal resistance 1Ω?



Sol.



$$\frac{V-20}{8}=\frac{V}{6}=5$$

$$6V-120+8V=48\times5$$

$$14V=360$$

$$V=\frac{360}{14}$$

$$I=\frac{V-20}{8}$$

$$I=\frac{\frac{360}{14}-20}{8}=0.714\,\text{A}$$

Q.19. If the rated frequency of induction motor is 60 Hz with slip of 7%, then find the frequency of rotor.

Sol. Rotor frequency = slip × rated frequency

= s × 60

= 0.07 × 60

= 4.2 Hz.

SECTION B : NON-TECH

Q.1. What is the ranks of India in Asian para games, China?

Sol. India finished 5th total wedal tally III gold 29, silver 31 and Bronze 51.

Chain lagged the first place with 521 medals.

Q.2. Right to health bill passed by which state?

Sol. Rajasthan

Central level, The right to universal and free health care bill, 2019.

Q.3. Who appoints chief information commissioner?

Sol. President on the recommendation of committee including PM, LOP in Lok Sabha and a unit cabinet minister nominated by PM.

Heeralal Samariya

Q.4. Smallest unit of biology.

Sol. Cell

Q.5. ATP formation?

Sol. Adenosine triphosphate (ATP) energy stored at cell level.

Streecture of ATP include nucleoside triphophate, hirogen base (adenine) a ribose suger and three serially bonded phosphate groups

Q.6. Eukaryotic cell.

Sol. Cells which have membrane bound nucleus. All animals, plants, fungi and many unicellalor organisum are eukaryotic eukaryotic cells contains organelles like mitochnodria, golgi appratus, endoplasmic reticuleum and lysosomes.

Compare with proparyotic any organism that locks a distinct nucleus nucleoid is not present in eukaryotic cells.

Q.7. Second most populous state as per censes roll.

Sol. Maharastra

Q.8. Ascending order of most populous state as per census roll?

Sol. U. P., Maharastra, Wstbangal, Bihar, Andra Pradesh, Madhya Pradesh

Q.9. Most population density state as per census roll?

Sol. Bihar, West Bangal, Kerala, Uttar Pradesh.