

EXCITING ELECTRICAL QUIZ (50)

Contribution by; C.Kaliyaperumal, Former Chief Engineer, TNEB, Tamilnadu, India

1. What will happen if neutral connection is cut?

If neutral is cut with 3 phases (400 volts) energized, then line voltage will appear in single phase supply points, that is 400 V in 230 V line.

2. Why radial distribution is supposed to have transformer, delta - wye to the downstream level?

This is to break the Zero sequence path at each transformer secondary voltage level and enable individual system grounding on each transformer secondary.

3. What is the main difference between Dyn11 & Dyn1?

The phase shift of secondary voltage with respect to primary is +30 degree (Lead) & -30 degree (Lag) respectively.

4. Why CT/PT secondary are earthed at one point?

To prevent Capacitance Coupling between primary & Secondary, which could result in the secondary winding floating at up to the primary voltage to ground. Double earthing causes circulating current resulting mal operation of the concerned relay.

5. Why low PF starting is in domestic air conditioning?

Mostly, Split phase induction motors are used in residential ACs which do not use starting capacitors & hence lower PF of 0.2 to 0.3 range starting used.

6. What's the normal operating temperature of batteries?

25 degree .C. 9 degree C raise in temperature will halve its life.

7. How to find line current of 415 V transformers/motors?

Multiply KVA/HP by 1.39 to get its load current in Amps.

8. What is Ferro resonance?

A phenomenon of over voltage and very irregular wave shape associated with the

excitation of saturable reactors in series capacitors in power systems mainly during single phase cut conditions in a 3 phase system.

9. Which reactance shall be used for short circuit calculation of generators?

X_d'' : Direct Axis Subtransient Reactance (Saturated at rated voltage) is used for short circuit calculations which flows during first few cycles of the fault. The fault current in two phase fault conditions shall be used for Relay settings and coordination.

Eg: X_d'' for 6 MW GEN: 0.2.

10. Which value shall be used for transformer inrush current, s/c calculation?

The base value of ONAN rating of the transformer shall be used.

11. What are the types of earthing system?

IT, TT, TN (TN-C, TN-S, TN-C-S).

TN-C-S is mostly used, the neutral is separated from the earth only at the service entrance panel & down stream of the distribution.

12. How much power for rotor of a generator is required?

Generally, 0.25% of generator rated power.

Example: 0.5 MW for a 200 MW GENERATOR.

13. Where are 400 Hz used?

Air crafts, Submarines, Military Applications due to light weight and high speed.

14. What are the effects of short circuit currents?

Thermal effects,
Dynamic forces,
System Stability.

15. How a lightning surge current is indicated?

Primary lightning surge: 10/350 μ s.

Secondary lightning surge: 8/20 μ s.

First number : Time taken to reach peak value.

Second number : Time taken to drop to 50% peak current.

16. Which is the optimum site test for transformer commissioning apart from LV tests?

HV Tan delta (Dissipation factor) test at 10 KV.

Also, excitation current test with tan delta test kit.

17. What is the minimum clearance for a 110 KV OH Lines over a terrace?

15 feet over a terrace.

6.7 to 7.6 metres from ground.

18. How to calculate S/C current of a generator?

S/C current is full load current of the generator divided by sub transient reactance of gen(X_d'').

Typical value: 0.15 unlinked with the size of generator.

19. What value is being set for instantaneous over current protection?

For asymmetrical fault current, it will be about 1.8 times the symmetrical fault current.

20. Which is enemy for a flow of electron?

HEAT.

21. Which parameter of an electrical equipment determines its Short Circuit Capacity (SCC) ?

Its impedance.

22. What do you mean by synchronization?

Matching the sine waves of two different sources.

23. What is the operating temperature for OH lines?

75 deg. C with 25deg. C ambient, well below the annealing temp(93 deg C) of aluminium.

24. What are the main conditions for paralleling transformer.?

Same polarity,
phase shift &
impedance.

25. What's amortissure winding?

A winding on the rotor shorted at both ends to dampen the waveform distortion during load changes.

26. How to measure soil resistivity?

Wenner's 4 point method.

By injecting ac current in between two probes and measuring the voltage in between two probes in perpendicular samples.

27. What is K rating in transformers?

Derating factor of transformer due to harmonics.

28. What is Clophen?

It is a PCB used in transformer for insulation and cooling.

29. What's droop control of generator?

Decrease or increase in governor setting of the generator as the frequency decreases or increases.

Normally it is about 4 to 5 %.

All generators in parallel must be set in the same setting.

1 % of speed change varies 25 % of its output.

30. What is the convention of Current flow direction?

Franklin convention of direction,;

Current flow is from +ve to --ve whereas the flow of electrons is from --ve to +ve.

31. What are holes ?

Holes are positively charged atoms. Hole current is not the same as electron current & its mobility is less than 50% of normal current & its only through semiconductor.

er 32. Transformer charging without load or with minimum .load.-

Which is better?

As L/R time constant only decides DC decaying duration, it is better to charge the transformer with minimum load.

33. Why capacitor blocks DC but conducts AC?

As DC is unidirectional, the capacitor gets charged initially while giving supply and no more charge & hence blocked.

Whereas, as AC is of alternating its polarity for 50 times per second, the capacitor also gets charged and discharged accordingly, thus conducting AC through it.

34 What is power factor?

The ratio of real power to apparent power is power factor of the system.
If the peaks and troughs of voltage & current waves occur at the same time it is UPF.

35. What are Electrical Engineering 8 basic laws.

- (i) Ohm's Law.
- (ii) Law of Resistance.
- (iii) Joule's Law of Heating.
- (iv) Fleming's right-hand rule.
- (v) Fleming's Left Hand Rule.
- (vi) Faraday's Law.
- (vii) Lenz's Law.
- (viii) Kirchhoff's current & Voltage law.

37. What is KW?

KW is kilo Joules/sec
& MW is mega Joules/sec.

38. Define DYn11 transformer vector group.

Indicates transformer primary & secondary winding connections.
LV Voltage & Current always lead HV side Voltage & Current by 30 degrees
. Phase markings clockwise & phase rotation in anticlockwise.

39. What are the types of batteries?

Lead -Acid.
Lithium --Ion.
Nickel-Cadmium.
These batteries are re-chargeable.

Aluminium-Air batteries
are non rechargeable batteries.

40. ELECTRIC (மின்சாரம்) என்ற வார்த்தையை முதன்முதலில்
பயன்படுத்தியவர் வில்லியம் கில்பெர்ட் (1544-1603) □□□

41. What's Bio Electricity?

நமது உடலின் இயக்கங்களின் கட்டுப்பாடு, சிக்னல்லிங், இதய இயக்க

கட்டுப் பாடு,முளை இயக்கம் அனைத்தும்,நமது உடலில் உற்பத்திமாகும் மின்சாரம் மூலமே இயங்குகிறது.

மிகமிகச் சிறிய நமது மைக்ரோ அல்லது நானோ பவர் சிஸ்டத்தோடு ,மாபெரும் வெளி பவர் சிஸ்டம் மிங்கிளாக முயற்சிக்கும் போது மரணம் சம்பவிக்கிறது.

42. What are the interstate transmission charges in India?

The interstate transmission charges consists of injection point charges(UP:10 Paise) and withdrawal point charges (TN:13 Paise) based on PoC tariff and the transmission loss for both injecting and with drawing entity.

Eg:NR:1.40 % & SR High category :2.31% (Varies for quarter)

43.Enumerate about DGA.

High CO,CO₂:Thermal over heating.

High Acetylene(C₂H₂):
Arcing.

H₂:Less than 500 PPM is normal.
ROGERS Ratio of
CH₄/H₂:0.1 TO 1.0.

The more important factor of DGA gases is not only the ppm, mainly, the trending whether upward or downward.

Total gas content shall be about within 15%. C₂H₁₆:Ethane.

Gas Ratios:Roger,IEC,DOREMBERG,DUVEL.

CO₂/CO:25-OK.

Other Tests:

Dielectric oil test,

Moisture content,

Karl Fisscher,

Oxidation Inhibitor,

Power factor.

H₂ high content alone will not indicate any fault but only combined with other gases.

44. What is Corona?

When there is high enough potential(more than 14 kv/cm) to ionise the air around a live conductor, Corona discharge occurs, ozone & nitrates are formed which damage the insulation.

45. Which is the best relay for generator protection?

High Impedance differential relay biased differently as the settings keep on increasing with fault current.

46. Why transformers fire and burst?

Mainly due to tank rupture which enables air entry into the tank for fire initiation, fire occur in transformer when its oil loses its dielectric strength.

Also,

(i) Low oil level.

(ii) Voltage surges.

(iii) Presence of appreciable quantum of combustible gases viz,

Hydrogen,

Methane,

Ethane,

Methelyne,

Acetylene,

Ageing,

Insulation failures.

47. Is the earthing of Surge Arrester (SA) to be combined with system earthing?

Yes, To have equal relative potential at all points of the facility. It also depends on the relative distance of SA & system grounding.

48. What is wave of AC Voltage and current?

Mono chromatic Transverse Sinusoidal Electro Magnetic (MTSEM) Wave.

49. State typical X/R ratio for 110 kV & 230 kV equipment?

3.4 & 7.36 respectively.

50. What are the factors that decide voltage regulation?

Load & PF, Resistance & Reactance.

