SMART EDITION

2
VOLUME

ELECTRICAL ENGINEERING

MCQ

Assistant Engineer & Junior Engineer

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Preface

This book has been written to meet the growing requirements of candidates appearing for State Engineering Service Examination, Junior Engineer, Public Sector Units, RRB-JE and Metro Exams. Though every candidate has ability to succeed but competitive environment, in-depth knowledge, quality guidance, time management and good source of study is required to achieve goals.

This book includes Multiple Choice Questions (MCQ Volume-II) which works as a mock exam practice for the reader. Questions of all the subject have been organized in systematic, concepts oriented and error less manner so that it become easy and interesting for even a beginner to understand. It is a very convenient book and must be solved by candidate aiming for competitive exams.

After solving this booklet students can feel encouraged and develop confidence to attempt each and every type of numerical as well as theoretical problems. Each problems explains solving approach so that at the end, so the reader is well equipped to be able to apply any type of problem solving requirement and distinctly choose one strategy or type from the other.

We hope this book will be proved an important tool to succeed in State Engineering Service Examination, Junior Engineer, Public Sector Units, RRB-JE and Metro Exams.

It is earnestly hoped that with the extensive additions and revisions, the present edition will facilitate the students not only in preparing themselves for competitive examinations but also in preparing for their regular examinations and prove more useful to the students than the earlier editions.

Even though, enough readings were given for correcting the error and printing mistakes, due to human tendency there could be some minor typos in the book. If any such typos found, they will be highly appreciated and incorporated in the next edition. Also, please provide your valuable suggestions at :engineers.academy.india@gmail.com

All the Best!

Engineers Academy Editorial Board

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UNIT-I

POWER SYSTEM

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CHAPTER 1

GENERATION OF ELECTRICAL POWER & ECONOMIC CONSIDERATION

OBJECTIVE QUESTIONS

1. The secondary sources of energy are

(a) Solar, wind and water

(b) Coal, oil and uranium

(c) Either (a) or (b)

(d) Neither (a) or (b)

2. The draught which a chimney produces is called

(a) Induced draught (b) Natural draught

(c) Forced draught (d) Balanced draught

3. The draught in locomotive boilers is produced by

(a) Forced fan

(b) Chimney

(c) Steam jet

(d) Only motion of locomotive

4. Caking coals are those which

(a) Burn completely

(b) Burn freely

(c) Do not form ash

(d) Form lumps or masses of coke

5. Blowing down of boiler water is the process

(a) To reduce the boiler pressure

(b) To increase the steam temperature

(c) To control the solid concentration in the boiler water by removing some of the concentrated saline water

(d) None of the above

6. The blades of the gas turbine rotor are made of

(a) Carbon steel

(b) Stainless steel

(c) High alloy steel

(d) High nickel alloy (Nimic 80)

7. Fission chain reaction is possible when

(a) Fission produces the same number of neutrons which are absorbed

(b) Fission produces more neutrons than are absorbed

(c) Fission produces less neutrons than are absorbed

(d) None of the above

8. A consumer has to pay lesser fixed charges in

(a) Flat rate tariff

(b) Two part tariff

(c) Maximum demand tariff

(d) None of the above

9. In Hopkinson demand rate or two part tariff the demand rate or fixed charges are

(a) Dependent upon the energy consumed

(b) Dependent upon the maximum demand of the consumer

(c) Both (a) and (b)

(d) None of the above

10. In a load-duration curve for an integrated power system the uppermost crest represents the energy contributed by

(a) Base power station

(b) Major thermal station

(c) Peaking hydro or gas turbine stations

(d) Non-conventional power stations

11. The voltage of a single solar cell is

(a) 0.2 V (b) 0.5 V

(c) 1.0 V (d) 2.0 V

12. Load curve is useful in deciding the

(a) Operating schedule of generating units

(b) Sizes of generating units

(c) Total installed capacity of the plant

(d) All of the above

13. Annual operating expenditure of a power plant consists of

(a) Fixed charges

(b) Semi-fixed charges

(c) Running charges

(d) All of the above

14. Direct conversion of heat into electric power is possible through

(a) Fuel cell

(b) Batteries

(c) Thermionic converter

(d) All of the above

15. A pilot exciter is provided on generators for which of the following reasons?

(a) To excite the poles of main exciter

(b) To provide requisite starting torque to main exciter

(c) To provide requisite starting torque to generator

(d) None of the above

16. The maximum demand of a consumer is 2 kW and his daily energy consumption is 20 units. His load factor is

(a) 10% (b) 41.6%

(c) 50% (d) None of the above

17. The economizer, a component of steam power plants, is a heat-exchanger utilising the waste heat of

(a) Bleed-steam to heat the feed water

(b) Flue-gas to heat the feed water

(c) Flue-gas to heat the air going into the boiler

(d) Flue-gas to heat the pulverised coal

18. Match List-I (Power plant) with List-II (Application) and select the correct answer using the codes given below

	List-I		**List-II**
A.	Nuclear	**1.**	Base load
B.	Diesel	**2.**	Stand by
C.	Gas turbine	**3.**	Base load or peak load
D.	Hydro	**4.**	Peak load

Codes:	**A**	**B**	**C**	**D**
(a)	1	3	4	2
(b)	4	2	1	3
(c)	4	3	1	2
(d)	1	2	4	3

19. Match List-I (Pressure head) with List-II (Type of turbine) and select the correct answer using the codes given below the lists

	List-I		**List-II**
A.	Low head	**1.**	Kaplan
B.	Medium head	**2.**	Francis
C.	High head	**3.**	Pelton

Codes:	**A**	**B**	**C**
(a)	1	2	3
(b)	3	2	1
(c)	2	3	1
(d)	2	1	3

20. The instantaneous power taken by a balanced three-phase load supplied from a balanced three phase source is

(a) Zero

(b) A constant value

(c) A pulsating function with a non-zero average

(d) Alternating with a zero average

21. To increase power transfer capability of a long transmission line, we should

(a) Increase line resistance

(b) Increase transmission voltage

(c) Decrease line reactance

(d) Both (b) & (c)

[DMRC JE - 2016]

22. The moderator is used in nuclear power plant to

(a) prevent the reactor from harmful radiation

(b) increase the speed of neutron

(c) decrease the speed of neutron

(d) coolent

[LMRC JE - 2015]

23. Lignite, bituminous and anthracite are different ranks of

(a) Nuclear fuel (b) Coal

(c) Biogas (d) Natural gas

[TNPSC AE - 2018]

24. In a nuclear reactor, heavy water can be ideally used as

(a) Biological shield (b) Moderator

(c) Control rods (d) All of the above

25. Value of Power factor lies in between

(a) 0 and 1 (b) 0 and 10

(c) 10 and 100 (d) 10 and 1000

26. Which of the following is a device capable of supplying electrical energy?

(a) Microwave (b) Radio transmitter

(c) Solar cell (d) None of these

27. Large turbo-generators are usually driven by _____.

(a) Coal turbine (b) Steam turbine

(c) Diesel turbine (d) Water turbine

[UPPCL JE - 2014]

28. What is the maximum possible output of a solar array?

(a) 500 W/m^2 (b) 250 W/m^2

(c) 500 kW/m^2 (d) 250 mW/m^2

[DSSSB JE - 2014]

29. If maximum load of generating station and the rated plant capacity are equal then

(a) Load factor is 1

(b) Capacity factor is 1

(c) Load factor and capacity factor are equal

(d) Utilization factor is poor.

[UPPCL JE - 2014]

30. Which of the following expressions depicts the Utilization Factor?

(a) Ratio of maximum generator demand to the generator capacity.

(b) Ratio of actual energy produced to the generator capacity.

(c) Ratio of generator capacity to maximum generation demand.

(d) Ratio of generator capacity to actual energy produced.

[UPPCL JE - 2014]

31. In a star connected balanced circuit the phase difference between the line voltage V_{RY} and the phase voltage V_{RN} is equal to

(a) $30° - \phi$ (b) $60°$

(c) $120°$ (d) $30°$

[NMRC JE - 2017]

32. The following generating station has the minimum running cost

(a) Diesel power station

(b) Nuclear power station

(c) Hydroelectric power station

(d) Thermal power station

[NMRC JE - 2017]

33. The normal phase sequence of a 3 phase AC supply is

(a) RBY (b) RYB

(c) BRY (d) YBR

[NMRC JE - 2017]

34. The ratio of average load to the maximum demand during a given period is _____.

(a) Demand factor (b) Diversity factor

(c) Load factor (d) Connected load

[NMRC JE - 2017]

35. In a nuclear power station, moderator is used to

(a) Accelerate the speed of neutrons

(b) Stop the chain reaction

(c) Absorb neutrons

(d) Reduce the speed of neutrons

[NMRC JE - 2017]

36. To a star connected 3 phase system, relationship between line voltage and phase voltage is given by

(a) $V_L = V_{ph}$ (b) $V_L = 3V_{Ph}$

(c) $V_L = \sqrt{3}\, V_{Ph}$ (d) $V_L = \sqrt{2}\, V_{Ph}$

[NMRC JE - 2017]

37. Induced draft fans are located at

(a) The top

(b) The bottom

(c) In the middle part

(d) Can be anywhere, in the cooling tower

38. The disadvantages of renewable source of energy is /are

(a) Intermittency

(b) Lack of dependability

(c) Availability in low energy densities

(d) All the above

39. Which of the following is usually not the generating voltage

(a) 6.6 kV (b) 11 kV

(c) 12.5 kV (d) 13.2 kV

40. Large size steam power plants and nuclear plants are suitable for

(a) Base loads

(b) Intermediate loads

(c) Peak loads

(d) Both base and peak loads

[TNPSC AE - 2018]

41. Which plant can be never have 100% load factor

(a) Nuclear power plant

(b) Peak load plant

(c) Hydro electric power plant

(d) Base load plant

42. More heat loss in a steam power station occurs in

(a) Boiler (b) Super heater

(c) Economiser (d) Condenser

43. A commercial and an ideal regulated power supply should have

(a) 100%, 50% regulation

(b) 1%, 0% regulation

(c) 100%, 0% regulation

(d) 100%, 100% regulation

44. Which of the following connections of a three phase transformer are best suited for 3-phase, 4-wire service ?

(a) $\Delta - \Delta$ (b) Y – Y

(c) Δ – Y (d) Y – Δ

[UPPCL JE - 2007]

45. Kaplan turbines are used whenever the water head is

(a) low (b) high

(c) medium (d) both (b) and (c)

[UPPCL JE - 2007, 2018]

46. Economisers are used to heat

(a) Coal (b) Air

(c) Steam (d) Feed water

[UPPCL JE - 2007]

47. In thermal power plants, the pressure of working fluid cycle is developed by

(a) Condenser (b) Superheater

(c) Feed water pump (d) Turbine

[UPPCL JE - 2007]

48. A gas turbine power plant is best suited for

(a) Base load

(b) Peak load

(c) Emergency purpose

(d) None of the above

[UPPCL JE - 2007]

49. Out of the following plant categories

(i) Nuclear (ii) Run-off river

(iii) Pump storage (iv) Diesel

The base load power plants are

(a) (i) and (ii) (b) (ii) and (iii)

(c) (i), (ii) and (iii) (d) (i), (iii) and (iv)

[UPPCL JE - 2007]

50. Which of the following components is not a part of hydro-electric plant ?

(a) Penstock (b) Spillway

(c) Surge tank (d) Economiser

[UPPCL JE - 2007]

51. The pH value of water used for boiler of thermal power plant is

(a) Unity

(b) 7

(c) Slightly more than 7

(d) 10

[Uttarakhand JE - 2013, UPPCL JE - 2007]

52. The expression for power plant output in kilo-watt of a hydro-electric plant is given by

(a) $\frac{0.736\ Q.W.h}{75 \times \eta_o}$ (b) $\frac{0.736\ Q.Wh \cdot \eta_0}{75}$

(c) $\frac{75 Q \cdot Wh \cdot \eta_0}{0.736}$ (d) None of these

[Uttarakhand JE - 2013, UPPCL JE - 2007]

53. The first nuclear power plant was built in India at which place ?

(a) Tarapur (b) Rana Pratap Sagar

(c) Kalpakkam (d) Narora

[UPPCL JE - 2007]

54. Which alternator will have more number of poles?

(a) Coupled to steam turbine

(b) Coupled to gas turbine

(c) Coupled to hydraulic turbine

(d) None of the above

[Uttarakhand JE - 2013, UPPCL JE - 2007]

55. The connected load of a consumer is 2 kW and his maximum demand is 1.5 kW. The demand factor of the consumer is

(a) 0.375 (b) 0.75

(c) 1.33 (d) None of these

[UPPCL JE - 2007]

56. Which of the following is not a part of Steam Power Plant?

(a) Switch Yard (b) Ash precipitators

(c) Draught fan (d) Surge Chamber

[UPPCL JE - 2016]

57. Pollution due to Tidal Energy generation is usually

(a) Zero (b) Low

(c) Moderate (d) High

[UPPCL JE - 2016]

58. In a bio-gas plant, dome/gas collector is usually _____ in shape.

(a) Conical (b) Hemispherical

(c) Cuboidal (d) Pyramidal

[UPPCL JE - 2016]

59. Capital cost on a nuclear plant is

(a) Very low (b) Low

(c) Moderate (d) Very high

[UPPCL JE - 2016]

60. ____ has the maximum life tenure.

(a) Wooden Poles

(b) Steel Poles

(c) Concrete Poles

(d) Steel Towers

[UPPCL JE - 2016]

217. Electric generating plant are inter connected to

(a) Ensure reliability of supply

(b) Maintain constancy of frequency

(c) Imporve voltage regulation

(d) To increase transmission efficiency

[UPPCL – 2013]

218. During the calculation of electric work expenses contingency expenses & material & labour cost are expected in precentage are respectively

(a) 1% (b) 15% to 10%

(c) 50% to 60% (d) 60% to 70%

[UPRVUNL – 2015]

219. Load shedding is done to

(a) Improve power factor

(b) Run the equipment efficiently

(c) Repair the machine

(d) Reduce peak demand

[UPRVUNL – 2015]

220. Which of the following expressions depicts the Utilization Factor?

(a) Ratio of maximum generator demand to the generator capacity

(b) Ratio of actual energy produced to the generaor capacity

(c) Ratio of generator capacity to maximum generation demand

(d) Ratio of generator capacity to actual energy produced

[UPRVUNL – 2014]

221. Demand Factor is defined as

(a) Maximum load/average load

(b) Average load/Maximum load

(c) Maximum load/ total connected load

(d) Total connected load/Maximum load

[LMRC 2015, DMRC – 2015]

222. The ratio of energy produced in a given time to the maximum possible energy that can be produced is

(a) Utilization factor

(b) Plant use factor

(c) Demand factor

(d) Load factor

[LMRC – 2015]

223. Direct conversion of heat electrical energy is done by

(a) Fuel cells (b) Stem cells

(c) Solar cells (d) MHD generators

[LMRC – 2015]

224. Which of the following in not a type of tariff?

(a) Flat demand rate

(b) Income rate

(c) Block meter rate

(d) Hopkinson demand rate

[LMRC – 2015]

225. Find out the average monthly load factor

Given data

Reading obtained for 1 month = 30 days

kWh drawn per month = 386540

Maximum demand = 1500 kW

(a) 35% (b) 45%

(c) 55% (d) 65%

[MP JE – 2016]

226. Which factor is a ratio of the sum of the individual maximum demands of the various subsystems of a system to the maximum demand of the whole system?

(a) Capacity factor

(b) Diversity factor

(c) Demand factor

(d) Load factor

[MP JE – 2016]

227. In electrical energy which type of tariff is also called as Doherty rate?

(a) Block rate tariff (b) Flat part tariff

(c) Two part tariff (d) Three part tariff

[MP JE – 2016]

228. In a load curve, the highest point represents the

(a) Average Load

(b) Base Load

(c) Diversified Load

(d) Peak Load

[UPPCL – 2016]

229. In which of the following power plants the availability of power is least reliable?

(a) Solar power plant

(b) Wind energy

(c) Tidal power plant

(d) Geothermal power plant

[HMWS-2012]

230. A gas turbine works on

(a) Carnot cycle (b) Brayton cycle

(c) Dual cycle (d) Rankine cycle

231. In power station practice "spinning reserve" is

(a) reserve generating capacity that is in operation but not in service

(b) reserve generating capacity that is connected to bus and ready to take the load

(c) reserve generating capacity that is available for service but not in operation

(d) capacity of the part of the plant that remains under maintenance

232. Tariff is defined as

(a) The monthly bill of the consumer

(b) The yearly bill of the consumer

(c) The rate at which electrical energy is sold to a consumer

(d) The rate at which power is purchased from a consumer

233. A generating station has maximum demand of 30 MW, load factor 60% and plant capacity factor of 50% The reserve capacity of the plant is

(a) 5 MW (b) 4 MW

(c) 6 MW (d) 10 MW

[UPPSC AE - 2020]

234. The maximum demand of a consumer is 2kW and the corresponding daily energy consumption is 30 units. What is the corresponding load factor?

(a) 25% (b) 50%

(c) 62.5% (d) 75%

[UPPSC AE - 2020]

235. Plant capacity factor of a power plant may be calculated by the formula

(a) $\frac{\text{Average demand}}{\text{Plant capacity}}$

(b) $\frac{\text{Sum of individual max .demand}}{\text{Max.demand of plant}}$

(c) $\frac{\text{Station output}}{\text{Plant Hours of use}}$

(d) $\frac{\text{Plant capacity}}{\text{Average demand}}$

[DMRC JE - 2018]

236. Impulse turbines are used in

(a) Very low head plants

(b) High head plants

(c) Medium head plants

(d) Low head plants

[DMRC JE - 2018]

237. An industrial consumer has a daily load pattern of 4000 kW at 0.8 lag for 10 hrs and 1000 kW unity power factor for 16 hrs. The daily load factor is

(a) 1.0 (b) 2.0

(c) 0.75 (d) 0.5

[DMRC JE - 2018]

238. The purpose of cooling tower is

(a) To send cool water to boiler

(b) To reduce the flue gas temperature

(c) To cool the air to be sent to furance

(d) To cool the steam in the condenser

[TRANSCO-SE-2012]

239. Within the boiler of Thermal Power Station, the steam has highest temperature in

(a) Water tubes (b) Water walls

(c) Water drum (d) Superheater

[RPSC VPITI - 2016]

240. Which of the following coal has highest calorific value

(a) Peat (b) Lignite

(c) Bituminous (d) Anthracite

241. In Tarapur Nuclear power plant_____.

(a) Pressurised water reactor

(b) Boiling water reactor

(c) Sodium graphite reactor

(d) Fast Breeder reactor

242. The reflector of nuclear reactor is made up of

(a) Barilium (b) Boron

(c) Brass (d) Copper

[UPPCL JE - 2019]

243. Which type of Energy storage is only large scale storage method in use at present

(a) Mechanical energy storage

(b) Storage in compressed gas

(c) Kinetic energy storage

(d) Potential energy storage in pumped hydro

[UPPCL JE - 2019]

244. The quality of coal generally received by cement plants in the country has an ash content in the range of _____.

(a) (80 - 90)% (b) 100%

(c) (30 - 40)% (d) 90%

[UPPCL JE - 2019]

245. The first thermal power plant of India is

(a) Mundhra Ultra Mega Power Plant

(b) Hussain Sagar Thermal Power Station

(c) Vindhyachal Thermal Power Station

(d) Jharsuguda Thermal Power Station

[UPPCL JE - 2019]

246. Which of the following is the correct sequence for heat transfer to water in a generator?

(a) Economiser, Evaporator, Superheater

(b) Superheater, Economiser, Evaporator

(c) Economiser, Superheater, Evaporator

(d) Evaporator, Superheater, Economiser

[UPPCL JE - 2019]

247. In a steam power plant, the working fluid is:

(a) Oil (b) Water

(c) Diesel (d) Natural gas

[UPPCL JE - 2019]

248. Which of the following CANNOT be covered under the head of initial cost of power plant?

(a) Equipment cost

(b) Maintenance cost

(c) Land cost

(d) Building cost

[UPPCL JE - 2019]

249. What is the motor load factor when a motor of 20 hp drives a constant 15 hp load whenever it is on ?

(a) 75% (b) 65%

(c) 85% (d) 95%

[LMRC JE - 2020]

250. Generators for peak load plants are usually designed for maximum efficiency at

(a) Full load

(b) 25 to 50 % full load

(c) 50 to 75% full load

(d) 25 % overload

[PGCIL - 2018]

251. How can we increase the frequency of the voltage generated by a generator?

(a) Adjusting the governor

(b) Using reactors

(c) Increasing the load

(d) Reducing the terminal voltage

[PGCIL - 2018]

252. The generation of hydroelectric power does not depend on

(a) Specific weight of the water

(b) Rate of the flow of water

(c) Height of water head

(d) Efficiency of the evaporator

[PSPCL JE - 2019]

253. A generating station has average demand and maximum demand of 48000 kW and 96000 kW respectively. If the plant capacity factor is 0.48, the installed capacity will be

(a) 200000 kW (b) 250000 kW

(c) 200000 kWh (d) 100000 kW

[PSPCL JE - 2019]

254. The economiser of steam turbine system is located in the

(a) Turbine circuit

(b) Feeding water circuit

(c) Coal handling plant

(d) Condenser circuit

[PSPCL JE - 2019]

255. The maximum demand on a power generating station is 500 MW. If the annual load factor is 50% the total energy generated annually is

(a) 9125×10^5 kWh (b) 1825×10^5 kWh

(c) 438×10^7 kWh (d) 219×10^7 kWh

[PSPCL JE - 2018]

256. In steam power stations, the condenser creates a_____at the exhaust of the turbine.

(a) Very high pressure

(b) Very low pressure

(c) Very high temperature

(d) Very low temperature

257. A plant having load factor of 0.6 has a peak load of 100 MW. The energy produced by this plant for a month of 30 days is

(a) 432×10^5 units

(b) 211×10^3 units

(c) 412×10^3 units

(d) 2000 units

258. The ratio of a power plant's actual output over a period of time to its potential output if it were possible for it to operate at full nameplate capacity continously over the same period of time is known as

(a) Demand factor

(b) Diversity factor

(c) Average load

(d) Plant capacity factor

259. The daily load factor is calculated as

(a) $\frac{\text{No. of units consumed per day}}{\text{Max. demand of the day}}$

(b) $\frac{\text{No. of units consumed per day}}{24 \times \text{Max. demand of the day}}$

(c) $\frac{24 \times \text{Max. demand of the day}}{\text{No. of units consumed per day}}$

(d) $\frac{\text{Max. demand of the day}}{\text{No. of units consumed per day}}$

260. The maintenance cost for the electrical equipment is called

(a) Depreciation cost

(b) Investment cost

(c) Auxiliary cost

(d) Operating cost

261. The surge tanks are usually provided in high or medium head_____power plants when considerably_____is required.

(a) Hydro-electric, short penstock

(b) Hydro-electric, long penstock

(c) Thermal, short penstock

(d) Thermal, large steam turbine

262. The generation of power in a power plant has to be controlled to meet the

(a) Demand of load and power factor

(b) Demand of load only

(c) Demand of load and frequency

(d) Frequency and power factor

263. The overall efficiency of a steam power station is computed as

(a) $\frac{\text{Steam energy}}{\text{Heat of combustion of coal}}$

(b) $\frac{\text{Heat equivalent of electrical output}}{\text{Heat of combustion of coal}}$

(c) $\frac{\text{Heat equivalent of mech. energy transmitted to turbine shaft}}{\text{Heat of coal combustion}}$

(d) $\frac{\text{Heat of combustion coal}}{\text{Mech. energy}}$

264. The factors influencing costs and tariffs of electric supply are

(a) (i) Standing charges that are independent of the output and (ii) running or operating charges that are proportional to the output

(b) (i) Standing charges that are proportional to the output and (ii) running or operating charges that are independent of the output

(c) (i) Standing charges that are proportional to the output and (ii) running or operating charges that are proportional to the output

(d) (i) Standing charges that are independent of the output and (ii) running or operating charges that are independent of the output

265. Tariff is defined as the rate at which _____ is supplied to a consumer.

(a) Power (b) Current

(c) Energy (d) Voltage

[PGCIL - 2018]

266. Which of the following generating power stations requires lot of time for starting?

(a) Steam power station

(b) Diesel power plant

(c) Hydro-electric power plant

(d) Nuclear power plant

[PGCIL - 2018]

267. When the rate of electrical energy is charged on the basis of maximum demand of the consumer and the units consumed it is called

(a) Simple tariff (b) Block rate tariff

(c) Two-part tariff (d) Flat rate tariff

[PGCIL - 2018]

268. Two-part tariff is based on

(a) A fixed charge proportional to the maximum demand

(b) Sliding scale

(c) Fixed charge on the actual number of units used

(d) Fixed charge proportional to the maximum demand and a low running charge proportional to the actual numbers of units used

[PGCIL - 2018]

269. The maximum demand of a consumer is 4.4 kW and his total energy consumption is 8760 kWh if the energy is charged at the rate of 20 paise per unit for 500 hours use of the maximum demand per annum plus 10 paise per unit for additional units, calculate the annual bill

(a) ₹ 10060 (b) ₹ 1000

(c) ₹ 96 (d) ₹ 1096

[PGCIL - 2018]

270. When a given block of energy is charged at a specified rate and the succeeding blocks of energy are charged at progressively reduced rates it is called

(a) Maximum demand tariff

(b) Two-part tariff

(c) Power factor tariff

(d) Block rate tariff

[PGCIL - 2018]

271. Which of the below plants has highest overall efficiency?

(a) Steam power plant

(b) Hydro electric power plant

(c) Diesel power plant

(d) Nuclear power plant

[PGCIL - 2018]

272. A steam power station has an overall efficiency of 20% and 0.5 kg of coal is burnt per kWh of electrical energy generated. Calculate the calorific value of the fuel heat equivalent of 1 kWh is 860 kcal

(a) 8600 kcal/kg (b) 344 kcal/kg

(c) 860 kcal/kg (d) 2150 kcal/kg

[PGCIL - 2018]

273. In a thermal power plant, ash is collected in

(a) Mills (b) Hoppers

(c) Bunkers (d) Boiler

[APGenco-2012]

274. The average life of neutrons after they decay is

(a) 1 sec (b) 10 sec

(c) 100 sec (d) 1000 sec

[APGenco-2012]

275. Which material is used in controlling chain reaction in a nuclear reactor?

(a) Thorium (b) Heavy water

(c) Boron (d) Beryllium

[TRANSCO-AE-2012]

276. Which of the following turbines will be used for heads from 50 m to 200 m

(a) Kaplan

(b) Fixed vane propeller

(c) Francis

(d) Pelton wheel

[TRANSCO-SE-2012]

277. Which of the following heat exchangers is used to raise the temperature of steam from normal to super saturation level

(a) Air pre heater (b) Economizer

(c) Super heater (d) Condenser

[TRANSCO-SE-2012]

278. Which of the following treatments for water is used to remove non carbonate hardness

(a) Lime treatment (b) Soda treatment

(c) Distillation (d) Sedimentation

[TRANSCO-SE-2012]

279. The hoppers in electrostatic precipitator are generally_____in shape

(a) Cylindrical (b) Pyramidal

(c) Conical (d) Rectangular

[TRANSCO-SE-2012]

280. Which of the following is a cladding material in nuclear reactor

(a) Heavy water (b) Organic liquids

(c) Boron (d) Magnesium

[TRANSCO-SE-2012]

281. In which of the following reactors, reactor control is achieved by varying moderator level

(a) PWR

(b) BWR

(c) Liquid metal cooled reactor

(d) CANDU

[TRANSCO-SE-2012]

282. The rotor used in alternator for hydroelectric station is

(a) Salient pole rotor

(b) Cylindrical rotor

(c) Round rotor with ac excitation

(d) Non-salient pole rotor

[HMWS-2012]

283. The public sector unit associated with the manufacturing of steam power plant equipment in India is

(a) BHEL

(b) NTPC

(c) Heavy Engineering Corporation

(d) Neyveli Lignite corporation

[HMWS-2012]

284. The most appropriate operating speed in rpm of generation used in thermal, nuclear and hydro power plants would respectively be

(a) 3000, 300 and 1500

(b) 3000, 3000 and 300

(c) 1500,1500 and 3000

(d) 1000, 900 and 750

[HMWS-2012]

285. Electrostatic precipitator is installed between
(a) Coal bunker and boiler
(b) Boiler furnace and chimney
(c) Economiser and air heater
(d) Condenser and economiser
[HMWS-2012]

286. Gas turbine is widely used in
(a) Automotive
(b) Electric locomotives
(c) Aircrafts
(d) Pumping stations
[EPDCL-2014]

287. In hydroelectric plants
(a) Operating cost is high capital cost is high
(b) Operating cost is high and capital cost is low
(c) Operating cost is low and capital cost is low
(d) Operating cost is low and capital cost is high
[EPDCL-2014]

288. Effect of water hammer is reduced by using
(a) Spill ways (b) Dam
(c) An anvil (d) Surge tank
[APSPDCL-2014]

289. Boiler rating is usually defined in terms of
(a) Maximum temperature of steam in Kelvin
(b) Heat transfer rate in kJ/hr
(c) Heat transfer area in metre^2
(d) Steam output in kg/hr
[TGenco-2015]

290. When inspection doors on the walls of boilers are opened, flame does not leap out because
(a) These holes are small
(b) Pressure inside is negative
(c) Flame travels always in the direction of flow
(d) These holes are located beyond the furnace
[TGenco-2015]

291. For a diesel generating station the useful life is expected to be around
(a) 15 to 20 years (b) 20 to 50 years
(c) 75 to 100 years (d) 50 to 75 years
[PGCIL - 2018]

292. The use of regenerator in a gas turbine cycle
(a) Increases efficiency but has no effect on output
(b) Increases output but has no effect on efficiency
(c) Increases both efficiency and output
(d) Increases efficiency but decreases output
[TGenco-2015]

293. Reheating in a gas turbine
(a) Increases the compressor work
(b) Decreases the compressor work
(c) Increases the turbine work
(d) Decreases the turbine work
[TGenco-2015]

294. In steam turbine terminology, diaphragm refers to
(a) Separating wall between rotors carrying nozzles
(b) The ring of guide blades between rotors
(c) A partition between low and high pressure sides
(d) The flange connecting the turbine exit to the condenser
[TGenco-2015]

295. The rankine cycle efficiency of steam power plant is
(a) 60 - 80% (b) 45 - 80%
(c) 30-45% (d) 20 - 30%
[TGenco-2015]

296. The transfer of energy for reaction turbines is based on
(a) Newton's first law
(b) Newton's second law
(c) Newton's third law
(d) All of these
[KPTCL-AE-2015]

297. Which of the following is true with respect to a breeder reactor ?
(a) Its conversion ratio is greater than 1
(b) It is capable of generating more fissile materials than it consumes
(c) Both (a) and (b)
(d) None of the above
[KPTCL-AE-2015]

298. Pelton wheels are most efficient under the conditions of
(a) High pressure and High flow
(b) Low pressure and Low flow
(c) Low pressure and High flow
(d) High pressure and Low flow
[KPCL-AE-2015]

299. Which of the following is an example of a turbine?
(a) Battery (b) Transformer
(c) Wind mill (d) None of these
[GESCOM-AE-2015]

300. Which of the following is not a solid fuel
(a) Coal (b) peat
(c) coal tar (d) wood
[UPRVUNL Trainer-2015]

301. When steam is released to turbines, turbines produces
(a) Chemical energy
(b) Mechanical energy
(c) Electrical energy
(d) Electromechnical energy
[UPRVUNL Trainer-2015]

302. The plant capacity is determined by
(a) Maximum demand of a consumer
(b) Plant use factor
(c) Simultaneous maximum demand of all consumers
(d) Load factor
[TRANSCO-SE-2012]

303. A power plant has a maximum demand of 15 MW. The load factor is 50% and the plant factor is 40%. The operating reserve is
(a) 3 MW (b) 3.75 MW
(c) 6.0 MW (d) 7.5 MW
[TRANSCO-SE-2012]

304. An industrial consumer has a load of 1500 kW at 0.8 pf lag for 12 hrs and l000 kW at Upf for 12 hrs during a day. The daily load factor of the consumer is
(a) 0.666 (b) 0.833
(c) 0.8 (d) 1.25
[APSPDCL-2012]

305. The storage battery generally used in electric power station is
(a) Zinc carbon battery
(b) Lead acid battery
(c) Nickel cadmium battery
(d) Lithium-ion battery
[TGENCO-2015]

306. The load on the power plant w.r.t time for 24 Hr are given as

Time (Hr)	Load (MW)
0 - 6	40
6 - 8	50
8 - 12	60
12 - 14	50
14 - 18	70
18 - 22	80
22 - 24	40

The load factor of power station is as
(a) 0.75 (b) 0.71
(c) 0.60 (d) 0.68
[TGENCO-2015]

307. Power station having Load factor = 70%, capacity factor = 50%, used factor = 60% maximum demand = 20 MW then annual energy production is
(a) 122.8 GWh (b) 198.55 GWh
(c) 128.2 GWh (d) 188.82 GWh
[TGENCO-2015]

308. Reflector mirrors employed for exploiting solar energy are called the
(a) Mantle (b) Heliostats
(c) Diffusers (d) Ponds
[TSTRANSCO-2015]

309. The capital cost of power plant depends on
(a Total installed capacity only
(b) Total number of units only
(c) Total installed capacity and number of units as well
(d) Neither the installed capacity nor number of units.
[TSTRANSCO-2015]

310. The load duration curve for unity load factor will be of

(a) Rectangular shape

(b) Triangular shape

(c) L-shape

(d) I-shape

[TSTRANSCO-2015]

311. The unit heat rate characteristic of a thermal power unit shows

(a) Heat input per kWh of output versus the megawatt output of unit

(b) Heat input per kW of output versus the megawatt output of unit

(c) Heat input per kWh of output versus the megawatt hour output of unit

(d) Heat input per kW of output versus the megawatt hour output of unit

[TSSPDCL-2015]

312. If 'D' is diameter of circular area 'A' swept by rotor and 'V is wind speed, the wind power is proportional to

(a) AV^2 (b) A^2V^3

(c) D^2V^3 (d) DV

[TSSPDCL-2015]

313. A Pyrheliometer is an instrument to measure

(a) Temperature of solar photovoltaic cell

(b) Intensity of direct solar radiation at normal incidence

(c) Intensity of indirect solar radiation

(d) Efficiency of a solar photovoltaic cell

[TSNPDCL-2015]

314. The main function of economiser of a boiler plant is to

(a) Increase steam production

(b) Reduce fuel consumption

(c) Increase steam pressure

(d) Increase life of the boiler

[HMWS-2015]

315. The load of a consumer is generally measured in terms of

(a) Volts (b) amperes

(c) ampere hour (d) KW

[UPPCL-JE-2015]

316. One 1000 watt Heater works daily 4 hours. What will be its bill for 30 days @ ₹ 35 Paise per unit of electricity.

(a) ₹ 200 (b) ₹ 300

(c) ₹ 275 (d) ₹ 42.00

[UPPCL-JE-2014]

317. Load factor of a power station is generally _____.

(a) Zero

(b) More than unity

(c) Less than unity

(d) Unity

❑❑❑

ANSWERS SHEET

1. *Ans. (a)*
2. *Ans. (b)*
3. *Ans. (c)*
4. *Ans. (d)*
5. *Ans. (c)*
6. *Ans. (d)*
7. *Ans. (b)*
8. *Ans. (c)*
9. *Ans. (b)*
10. *Ans. (c)*
11. *Ans. (b)*
12. *Ans. (d)*
13. *Ans. (d)*
14. *Ans. (c)*
15. *Ans. (a)*
16. *Ans. (b)*

$$\text{Load Factor} = \frac{\text{Average Load}}{\text{Peak Load}} \times 100$$

$$= \frac{20}{2 \times 24} \times 100 = 41.6\%$$

17. *Ans. (b)*
18. *Ans. (d)*
19. *Ans. (a)*
20. *Ans. (b)*
21. *Ans. (d)*
22. *Ans. (c)*
23. *Ans. (b)*
24. *Ans. (b)*
25. *Ans. (a)*
26. *Ans. (c)*
27. *Ans. (b)*
28. *Ans. (b)*
29. *Ans. (c)*
30. *Ans. (a)*
31. *Ans. (d)*
32. *Ans. (c)*
33. *Ans. (b)*
34. *Ans. (c)*
35. *Ans. (d)*
36. *Ans. (c)*
37. *Ans. (a)*
38. *Ans. (d)*
39. *Ans. (c)*
40. *Ans. (a)*
41. *Ans. (b)*
42. *Ans. (d)*
43. *Ans. (b)*
44. *Ans. (c)*
45. *Ans. (a)*
46. *Ans. (d)*
47. *Ans. (c)*
48. *Ans. (b)*
49. *Ans. (a)*
50. *Ans. (d)*
51. *Ans. (c)*
52. *Ans. (b)*
53. *Ans. (a)*
54. *Ans. (c)*
55. *Ans. (b)*

$$\text{Demand Factor} = \frac{\text{Maximum Demand}}{\text{Connected Load}}$$

$$= \frac{1.5}{2} = 0.75$$

56. *Ans. (d)*
57. *Ans. (a)*
58. *Ans. (b)*
59. *Ans. (d)*
60. *Ans. (d)*

221. *Ans. (c)*

222. *Ans. (b)*

223. *Ans. (d)*

224. *Ans. (b)*

225. *Ans. (a)*

1 Month = 30 days

kWh drawn per month = 386.540 kWh

Monthly Load factor

$$= \frac{\text{Energy}(\text{kWh})\text{drawn in one month}}{\text{Max demand} \times 24 \times 30}$$

$$= \frac{386540}{1500 \times 24 \times 30} = 0.3579$$

Hence Load factor = 35%

226. *Ans. (b)*

227. *Ans. (d)*

228. *Ans. (d)*

229. *Ans. (b)*

230. *Ans. (b)*

231. *Ans. (b)*

232. *Ans. (c)*

233. *Ans. (c)*

$$\because \quad \text{Load Factor} = \frac{\text{A.D.}}{\text{M.D.}}$$

$$\Rightarrow \quad \text{A.D.} = 0.6 \times 30 = 18 \text{ MW}$$

$$\because \text{Capacity factor} = \frac{\text{A.D.}}{\text{P.C.}}$$

$$\Rightarrow \quad \text{P.C.} = \frac{18}{0.5} = 36 \text{ MW}$$

$$\because \quad \text{Res. cap} = \text{P.C.} - \text{M.D.}$$

$$= 36 - 30 = 6 \text{ MW}$$

234. *Ans. (c)*

$$\because \quad \text{Load factor} = \frac{\text{A.D.}}{\text{M.D.}}$$

$$= \frac{(30/24)}{2} = 62.5\%$$

235. *Ans. (a)*

236. *Ans. (b)*

237. *Ans. (d)*

$$\because \text{ Load factor} = \frac{\text{A.D}}{\text{M.D}}$$

$$= \frac{[(4000 \times 0.8 \times 10) + (1000 \times 1 \times 16)]/24}{4000}$$

$$= 0.5$$

238. *Ans. (d)*

239. *Ans. (d)*

240. *Ans. (d)*

241. *Ans. (b)*

242. *Ans. (a)*

243. *Ans. (d)*

244. *Ans. (c)*

245. *Ans. (b)*

246. *Ans. (a)*

247. *Ans. (b)*

248. *Ans. (b)*

249. *Ans. (a)*

$$\text{Load factor} = \frac{\text{Average load}}{\text{Peak load}} \times 100$$

$$= \frac{15}{20} \times 100 = 75\%$$

250. *Ans. (c)*

251. *Ans. (a)*

252. *Ans. (d)*

253. *Ans. (d)*

$\because$ Capacity factor

$$\text{CF} = \frac{\text{Average demand}}{\text{Installed capacity}}$$

$$\Rightarrow \text{ Installed capacity} = \frac{48000}{0.48}$$

$$= 100000 \text{ kW}$$

254. *Ans. (b)*

255. ***Ans. (d)***

Average load = MD × LF

= 500 × 0.5

= 250 × 10^3 kW

Annual Energy Generated

= 250 × 10^3 × 8760

= 219 × 10^7 kWh

256. ***Ans. (b)***

257. ***Ans. (a)***

Load factor

$\because$ $LF = \frac{\text{Average load}}{\text{Peak load}}$

$\Rightarrow$ Average load

= 0.6 × 100 = 60 MW

$\because$ Energy produced

= Average load × Time

= 60 × 30 × 24 × 10^3

= 432 × 10^5 KWh

= 432 × 10^5 units

258. ***Ans. (d)***

259. ***Ans. (b)***

260. ***Ans. (d)***

261. ***Ans. (b)***

262. ***Ans. (c)***

263. ***Ans. (b)***

264. ***Ans. (a)***

265. ***Ans. (c)***

266. ***Ans. (a)***

267. ***Ans. (c)***

268. ***Ans. (d)***

269. ***Ans. (d)***

MD × 500 × 0.20 + Remaining unit × ₹ 0.10

= 4.4 × 500 × 0.20+{8760 – (4.4×500)}×0.10

= 440 + 656 = ₹ 1096

270. ***Ans. (d)***

271. ***Ans. (b)***

272. ***Ans. (a)***

$\because$ Overall efficiency

$= \frac{\text{Electrical output (in kwh)}}{\text{Heat of combustion}}$

$\Rightarrow$ $0.2 = \frac{860\,\text{kcal}}{x \times 0.5}$

$\Rightarrow$ x = 8600 kcal/kg.

273. ***Ans. (c)***

Whole of the ash from the furnace should get deposited in the bunkers.

274. ***Ans. (c)***

275. ***Ans. (c)***

In order to control the nuclear reaction according to loading condition, the control rods are employed. The control rods will absorb the neutrons in order to reduce the nuclear reaction.

The materials which can be used for control rods are Boron & Cadmium.

276. ***Ans. (c)***

(i)Kaplan or movable vane propeller

$\rightarrow$ 2 < H < 15 m (for variable load operation)

(ii)Fixed vane propeller $\rightarrow$ 15 < H < 70 m

(fairly constant load operation)

(iii) Francis: 70 m < H < 500 m

(iv) pelton wheel: H > 500 m

277. ***Ans. (c)***

278. ***Ans. (b)***

279. ***Ans. (b)***

280. ***Ans. (d)***

Cladding material is magnesium.

281. ***Ans. (d)***

282. ***Ans. (a)***

Hydro turbines are more efficient at low speed, for low speed operations salient pole rotor is used.

283. ***Ans. (a)***

284. ***Ans. (b)***

285. ***Ans. (b)***

286. *Ans. (c)*

287. *Ans. (d)*

In hydroelectric plant the capital investment per kW is much higher plant in order to store water at sufficient head, to construct a dam. However, the running cost (or) operating cost is much less as no fuel is used.

288. *Ans. (d)*

The sudden change of pressure above the normal is known as water hammer. When the load on the system decreases, the turbine gates close partly this increases the water level in the surge tank, and velocity of water decreases. And when the load on the system increases, governor opens the turbine gates, this additional water is supplied by the surge tank and accelerating head is produced. The surge tank thus helps in stabilizing velocity and pressure in penstock and reduces the water hammer effect.

289. *Ans. (d)*

290. *Ans. (b)*

291. *Ans. (a)*

292. *Ans. (a)*

293. *Ans. (c)*

294. *Ans. (a)*

295. *Ans. (c)*

296. *Ans. (c)*

297. *Ans. (c)*

For breaker reader

Conversion ratio > 1

298. *Ans. (d)*

Higher the head lower is the discharge of water. As pelton wheel has highest operating head therefore, it will also have lowest discharge of water hence more efficient condition is high pressurfe and low flow.

299. *Ans. (c)*

Wind mill used as a turbine.

300. *Ans. (c)*

Coal tar is not a solid fuel. and coal peat, wood etc is solid fuel.

301. *Ans. (b)*

Steam is released to turbines, the turbines produces mechanical energy.

302. *Ans. (c)*

303. *Ans. (b)*

Maximum load $P_{max} = 15$ MW

Load factor $L_f = 0.5$

Plant capacity factor $P_{Cf} = 0.4$

Reserve capacity

$$R_C = \frac{P_{max}[L_f - P_{C_f}]}{P_{C_r}}$$

$$= \frac{15(0.5 - 0.4)}{0.4}$$

$$= 3.75 \text{ MW}$$

304. *Ans. (b)*

$$\text{Average load} = \frac{1500 \times 12 + 1000 \times 12}{24 \times 1500}$$

Load factor

$$L_f = \frac{1250}{1500} = 0.8333$$

305. *Ans. (b)*

306. *Ans. (b)*

$$L_f = \frac{\text{Total energy consumption / day}}{\text{Maximum demand} \times 8760}$$

$$= \frac{6 \times 40 + 2 \times 50 + 4 \times 60 + 2 \times 50 + 4 \times 70 + 4 \times 80 + 2 \times 40}{80 \times 24}$$

$$= 0.71$$

307. *Ans. (a)*

$$L_f = \frac{\text{Total annual energy generation}}{\text{Maximum demand} \times 8760}$$

Annual energy production

$= L_f \times$ maximum demand $\times 8760$

$= 0.7 \times 20 \times 8760$

$= 122.8$ GWh

308. *Ans. (b)*

309. *Ans. (a)*

310. *Ans. (a)*

311. ***Ans. (a)***

312. ***Ans. (c)***

$$P = 0.5\rho AC_P V^3 \eta_g \eta_b$$

$$\Rightarrow \quad P \propto AV^3$$

$$\Rightarrow \quad P \propto D^2V^3 \qquad \left(\because A = \frac{\pi D^2}{4}\right)$$

313. ***Ans. (b)***

A Pyrheliometer is an instrument to measure intensity of direct solar radiation at normal incidence.

314. ***Ans. (b)***

315. ***Ans. (d)***

The load of a consumer is measured in KW.

316. ***Ans. (d)***

Power (P) = 1000 watt

Time (t) = 4 hour

Day = 30 days

Energy consumed (KWh)

$$= \frac{\text{Power} \times \text{hour} \times \text{day}}{1000}$$

$$= \frac{1000 \times 4 \times 30}{1000}$$

= 120 Units

Total cost = 120 × 0.35

= 42 rupes.

317. ***Ans. (c)***

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