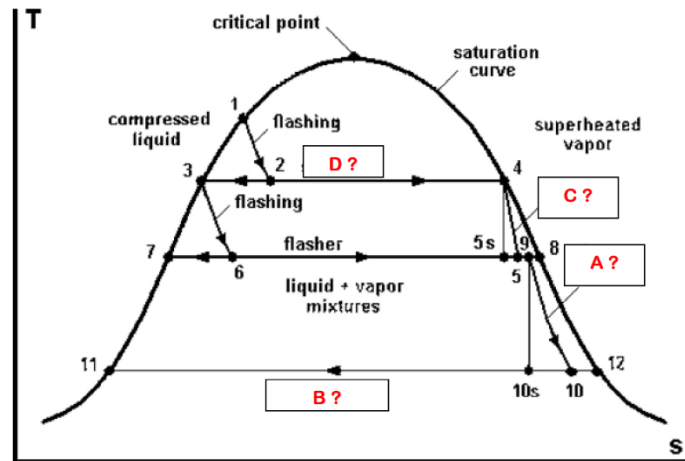


Name :

Institution :

**Answer the following questions by marking with "x" on the correct answers directly on this paper!**

1. For the following flash geothermal power plant, the order of the alphabet A, B, C, D are?



- A. LP Turbine, Condenser, HP Turbine, Separator
  - B. Separator, Cooling Tower, LP Turbine, Condenser
  - C. Cooling Tower, Condenser, Separator, LP Turbine
  - D. Cooling Tower, LP Turbine, Condenser, HP Turbine
2. Organic Rankine Cycle (ORC) has the following characteristics, except?
- A. Promising technology when low temp. geothermal resource can drive steam turbine directly or not contaminated with dissolved gasses or corrosive minerals.
  - B. Organic Rankine Cycle (ORC) uses a secondary liquid for delivering energy from geothermal fluid to the application.
  - C. Works in a closed loop working fluid system
  - D. Commonly used as bottoming unit in a flash steam plant to utilize low grade thermal energy from waste brine.
3. The important differences in respect of Rankine cycle plant design that follow from the envelope shapes are as follows, except?
- A. An isentropic expansion of saturated vapour results in a dry mixture at turbine exit for H<sub>2</sub>O and a superheated vapour for organic working fluid, provided that the expansion starts at a suitable temperature. This removes concern about blade erosion by droplets. The slope of the gas side

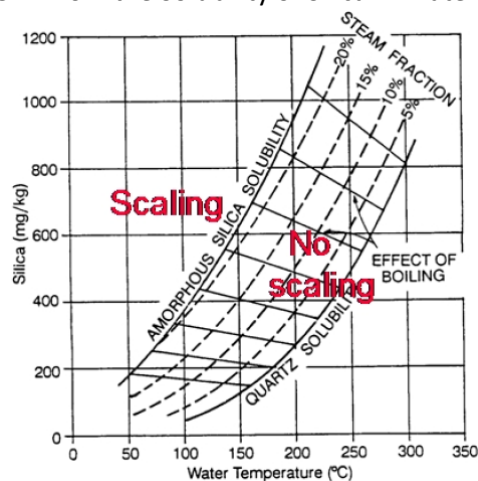
of the envelope is less steep for organic fluid than for water so the departure from the Carnot cycle is greater for the organic fluid, which, taken in isolation, would tend to make regenerative cooling more attractive than for steam Rankine cycles.

- B. The saturation envelope for organic fluid is fairly wide near its summit, which is beneficial in maximising the proportion of heat added during evaporation and helping to reduce the effect of departure from the Carnot cycle resulting from heating in the liquid state
- C. At 30 C, a suitable temperature for rejection of heat to the environment and thus the lowest temperature potentially required in the cycle, the saturation pressure of isopentane, in particular, is approximately 1 bar abs. This is mechanically convenient as the condenser leakage potential is minimized
- D. The density of gaseous organic fluid is high, which leads to a comparatively smaller turbine for a given output—the rate of transfer of momentum in the blades increases with density.

4. The following are the types of cooling system considerations for flash plants, except?

- A. Water cooled
- B. Air Cooled
- C. Solid cooled
- D. Hybrid cooling

5. From the Solubility of Silica in Water Graph we can conclude as follows, except?



- A. Silica scales are first formed when the amorphous silica solubility curve is passed
- B. It is clear that the “window of opportunity” for operating the geothermal plants free of silica scaling lies between the quartz and amorphous curves
- C. It is important that the reservoir temperature be as high as possible, because the higher the reservoir temperature, the higher the temperature of re-injected water needs to be that puts a lid on the thermal efficiency
- D. In practice that only some 25% of the water can be converted by “flashing” into steam from liquid dominated reservoirs without the danger of silica scales, almost independently of the temperature of the resource (flashing= rapid conversion of water into steam).

6. Sesuai UU 30 Tahun 2009 tentang Ketenagalistrikan, pelaksanaan usaha penyediaan tenaga listrik oleh Pemerintah dan pemerintah daerah dilakukan oleh badan usaha milik negara dan badan usaha milik daerah. Untuk penyediaan tenaga listrik, dan pemerintah daerah menyediakan dana untuk, kecuali?
- A. kelompok masyarakat tidak mampu
  - B. pengembangan sumber energi terbarukan;
  - C. pembangunan sarana penyediaan tenaga listrik di daerah yang belum berkembang
  - D. pembangunan tenaga listrik di daerah terpencil dan perbatasan
  - E. pembangunan listrik perdesaan
7. Pengoperasian pembangkit tenaga listrik harus mengacu pada ketentuan peraturan perundang-undangan mengenai Aturan Jaringan Sistem Tenaga Listrik (Grid Code) pada sistem setempat. Grid Code yang belum tersusun?
- A. Jawa Madura Bali
  - B. Sumatera
  - C. Kalimantan
  - D. Nusa Tenggara
  - E. Sulawesi
8. Dalam hal Biaya Pokok Penyediaan (BPP) Pembangkitan di sistem ketenagalistrikan setempat di atas rata-rata BPP Pembangkitan nasional, harga pembelian tenaga listrik dari PLTP, adalah?
- A. maximum  $85\% \times$  BPP Pembangkitan di sistem setempat
  - B. maximum  $85\% \times$  BPP Pembangkitan nasional
  - C. maximum  $100\%$  BPP Pembangkitan di sistem setempat
  - D. maximum  $100\%$  BPP Pembangkitan nasional
  - E. kesepakatan para pihak
9. Konstruksi pembangkit tenaga listrik yang memanfaatkan sumber energi terbarukan harus memenuhi standar sebagai berikut, kecuali?
- A. Standar Nasional Indonesia di bidang ketenagalistrikan
  - B. Standar Internasional
  - C. Standar yang setara ASBE
  - D. Standar negara lain yang tidak bertentangan dengan ISO atau IEC
  - E. Standar PLN

10. Lembaga Inspeksi Teknik (LIT) melakukan pemeriksaan dan pengujian instalasi tenaga listrik berdasarkan mata uji sesuai peraturan perundangan. Berdasarkan hasil pemeriksaan dan pengujian, LIT menerbitkan Sertifikat Laik Operasi (SLO). SLO untuk instalasi pembangkit tenaga listrik berlaku untuk jangka waktu selama ..... dan dapat diperpanjang.
- A. 3 (tiga) tahun
  - B. 5 (lima) tahun
  - C. 7 (tujuh) tahun
  - D. 10 (sepuluh) tahun
  - E. 15 (lima belas) tahun
11. Sebutkan UU yang mengatur panas bumi saat ini?
- A. 27/2014
  - B. 23/2014
  - C. 21/2014
  - D. 27/2017
  - E. 23/2017
12. Jangka waktu eksplorasi panas bumi berdasarkan regulasi terbaru panas bumi adalah?
- A. 3 tahun dan dapat diperpanjang 2x tahun
  - B. 5 tahun tidak termasuk termasuk FS
  - C. 5 tahun dan dapat diperpanjang 2x 1 tahun
  - D. 7 tahun
  - E. 7 tahun termasuk FS
13. Manakah yang merupakan Peraturan Pemerintah tentang Pemanfaatan tidak langsung panas bumi saat ini?
- A. PP 59/2014
  - B. 7/2017
  - C. 70/2014
  - D. 59/2009
  - E. 7/2014
14. Berikut ini yang saat ini bukan merupakan konsesi atas wilayah kerja panas bumi adalah?
- A. Izin Usaha Pertambangan Panas Bumi
  - B. Izin Panas Bumi
  - C. Kuasa Pengusahaan Panas Bumi
  - D. Penugasan kepada BUMN
  - E. IPB

15. Berdasarkan regulasi terbaru panas bumi, kewenangan pengelolaan panas bumi untuk pemanfaatan tidak langsung berada di?
- A. Pemerintah dan Pemda Provinsi dan Kabupaten Kota
  - B. Pemerintah
  - C. Pemda Provinsi dan Kabupaten/ Kota
  - D. Pemerintah dan Pemda Provinsi
  - E. Pemerintah dan Pemda Kabupaten/kota
16. Plant performance test should be done regularly in a geothermal power plant for the following purposes EXCEPT?
- A. contractual agreement
  - B. assessing the change of plant system performance regularly
  - C. assessing the change of plant system performance after turn round/ overhaul
  - D. increasing reliability
17. During 30 days period, Kamojang Unit 4 GPP has being 50% load for 2 days due to load dispatcher request, and being shut down for 1 day due to instrumentation failure. How much the Equivalent Availability Factor (EAF) of this GPP?
- A. 90%
  - B. 93,3%
  - C. 96,7%
  - D. 100%
18. During 2015, Kamojang Unit 4 Geothermal Power Plant 1 x 60 MW produced 509.832 MWh (net). The Net Capacity Factor for this power plant was?
- A. 95%
  - B. 96%
  - C. 97%
  - D. 98%
19. Maintenance Program should be performed in the geothermal power plant to ensure that all of equipment could continuously operate without any failures. This program could be proactive and reactive tasks. Which ONE of the following program that could be categorized as a reactive task?
- A. Vibration Monitoring
  - B. Infrared Thermography
  - C. Turbine Borescope Inspection
  - D. Fire System Protection Test

20. In condition monitoring context, the interval maintenance program of equipment is conducted based on?
- A. Criticality
  - B. Frequency of Failure
  - C. P-F Interval
  - D. MTBF
21. Geothermal power plant portion is dominant and about 50% of total geothermal development investment cost. Minimizing the risk, we need to apply well known international standard. The following standard are applicable for mentioned geothermal power plant development?
- A. ASME
  - B. ASTM
  - C. NFPA
  - D. All above standards can be applied
22. Corrosion is the most problematic during geothermal power plant operation. Therefore, it is required to select appropriate material for specific service. What is the appropriate material for gas extraction system especially for ejector body and nozzle?
- A. Carbon steel
  - B. Wrought iron
  - C. Copper alloyed material
  - D. Stainless steel
23. Geothermal fluid is vary from one site to other site. In specific geological setting the geothermal fluid can be too acidic for carbon steel made surface facilities so the corrosion rate can be very high. How to utilize those above geothermal fluid sustainably during commercial operation?
- A. Installing Na OH injection
  - B. Let it as it is
  - C. Add lining inside of the surface facility
  - D. Installing H<sub>2</sub>SO<sub>4</sub> injection
24. Which of the following processes and service applications is suitable for carbon steel?
- A. Air – instrument
  - B. Air – service
  - C. Steam
  - D. Condensate
25. The reliability of the geothermal power plant is depended on its main equipment & system performance. One of the main system is condenser. Therefore, some of the maintenance activities

are set and planned. Which one is NOT the correct maintenance activities for circulating water system in order to ensure condenser run smoothly?

- A. Addition of caustic soda is required to adjust the pH in the cooling tower circuit
- B. Cooling tower make-up water
- C. Blow-down is used to avoid accumulation of salts in the water caused by evaporation
- D. Inject condensate into the inlet steam during plant operation

26. Most geothermal fields are being constructed and operated in high terrain, mountainous area and varied contour. Which hazard potential is possible to occur?

- A. Extreme weather
- B. Poisonous gasses
- C. Slippery area
- D. All above Correct

27. To improve HSSE performance and work environment, all employees should apply positive safety culture that consist of?

- i. Better behaviours
- ii. Less errors & violations
- iii. Improved attitudes
- iv. Reduced number of incidents
- v. Safety culture

Which order is correct?

- A. ii, iii, iv, i, v
- B. v, iii, i, ii, iv
- C. v, ii, iii, i, iv
- D. i, v, iii, ii, iv

28. There are some requirements to ensure work activities can be done safely and can be accomplished with less errors, except?

- A. Permit to work
- B. Job safety analysis
- C. Read the instructions / manual books
- D. Signed contract

29. What is the meaning of risk mitigation implementation?

- A. Risk evaluation for selection of work equipment, chemical substances or preparations used, the fitting out of the workplace, and the organisation of work
- B. The process of developing options and actions to enhance opportunities and reduce threats to project objectives

- C. The process of executing risk mitigation actions by coordination to the competent user or division
- D. Track risks, identifying risks, and evaluate risks effective throughout the project

30. Which one is not categorised as HSSE golden rules?

- A. Wearing personal protective equipment
- B. Obey to regulation
- C. Care about safety
- D. Unsafe action intervention

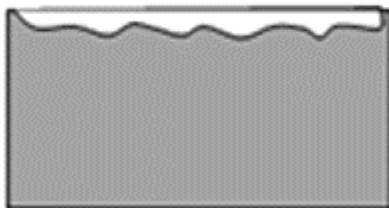
31. Which is NOT a NDT method?

- A. Eddy current testing
- B. Infrared Thermography
- C. Magnetic testing
- D. Microscope

32. Which material is often NOT used in geothermal power plants?

- A. Concrete
- B. Ceramics materials
- C. Steel
- D. Plastics

33. Which type of corrosion do you see here?



- A. Crevice corrosion
- B. Galvanic corrosion
- C. Uniform corrosion
- D. Stress corrosion

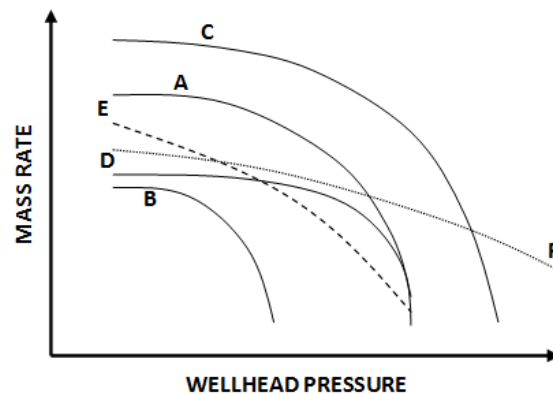


34. What do you have to do when a failure occurs to secure your safety?
- A. LMAR
  - B. LMRA
  - C. MRLA
  - D. LRMA
35. What is an advantage of a database that is being build?
- A. Identify critical areas
  - B. Capture experience in consistent way
  - C. Adapt inspection plans
  - D. Change available spare parts
36. Which one from the following parameters that does not affect the velocity of the fluid in the reservoir?
- A. Porosity
  - B. Permeability
  - C. Viscosity
  - D. Pressure difference between two points
  - E. Distance between two points
37. The single-phase steam flow can occur in the following equipment, except?
- A. Production well
  - B. Pipeline leaving separator
  - C. Scrubber
  - D. Turbine
  - E. Reinjection well
38. From the following flow regimes, which one that has low void-fraction?
- A. Bubbly
  - B. Plug
  - C. Stratified
  - D. Slug
  - E. Annular

39. The following flow meters utilize the obstruction principle, except?

- A. Venturi meter
- B. Orifice meter
- C. Rotameter
- D. Nozzle meter
- E. Pitot tube meter

40. Which deliverability curve that represents the scaling in the wellbore?



- A. Curve A
- B. Curve B
- C. Curve D
- D. Curve E
- E. Curve F

41. The amount of heat flow through a body by conduction is

- A. Directly proportional to the surface area of the body
- B. Directly proportional to the temperature difference on the two faces of the body
- C. Dependent upon the material of the body
- D. All of the above

42. Sensible heat is the heat required to

- A. Change vapour into liquid
- B. Change liquid into vapour
- C. Increase the temperature of a liquid or vapour
- D. Convert water into steam and superheat it

43. On tube banks surface, the layer of deposits that represents additional resistance to heat transfer is
- A. Fin
  - B. Insulator
  - C. Fouling
  - D. Cooler
44. LMTD in case of counter flow heat exchanger as compared to parallel flow heat exchanger is
- A. Lower
  - B. Higher
  - C. Same
  - D. None of the above
45. The type of cooling towers with maximum heat transfer from air to water is
- A. Mechanical draft
  - B. Natural draft
  - C. Both A and B
  - D. Neither A and B

@@@@@Good Luck@@@@@

Answers:

1. A
2. A
3. A
4. C
5. A
6. B
7. D
8. C
9. C
10. B
11. C
12. C
13. B
14. A
15. B
16. D
17. C
18. C
19. D
20. C
21. D
22. D
23. A
24. C
25. D
26. D
27. B
28. D
29. C
30. A
31. D
32. B
33. C
34. B
35. B
36. A
37. E
38. A
39. C
40. C
41. D
42. C
43. C
44. B
45. A