Registration form

PUMPS 303 $200.00

48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start and Finish Dates: _____
You will have 90 days from this date in order to complete this course

Name_____**Signature**_____
I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address_____

City_____**State**_____**Zip**_____

Email_____ **Fax (_____)** _____

Phone:
Home (_____) _____ **Work (_____)** _____

Operator ID #_____**Exp. Date**_____

Class/Grade_____
Your certificate will be e-mailed to you in about two weeks.

Please circle/check which certification you are applying the course CEU's.
Water Treatment ___ Water Distribution ___ Other _____

Collections ___ Wastewater Treatment ___ Onsite Installer_____

Oregon CCB ($50 additional fee) _____

Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
Toll Free (866) 557-1746 Fax (928) 272-0747 info@tlch2o.com

If you've paid on the Internet, please write your Customer#_____

Please invoice me, my PO#_____

We'll stop mailing the certificate of completion we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail it to you.

DISCLAIMER NOTICE
I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork. It is my responsibility to call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed.

Professional Engineers: Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

State Approval Listing URL…
http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf

AFFIDAVIT OF EXAM COMPLETION
I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information
In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Do not solely depend on TLC's Approval list for it may be outdated.

All downloads are electronically tracked and monitored for security purposes.

Some States and many employers require the final exam to be proctored.
http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf

Pumps 303 Answer Key

Name_____

Phone _____

You are solely responsible to ensure this course is accepted for credit by your State.
Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

What is the course approval number, if applicable? _____

You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it. <u>No refunds</u>.

Please Circle, Bold, Underline or X, one answer per question.

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

37. A B C D E F

38. A B C D E F

39. A B C D E F

40. A B C D E F

41. A B C D E F

42. A B C D E F

43. A B C D E F

44. A B C D E F

45. A B C D E F

46. A B C D E F

47. A B C D E F

48. A B C D E F

49. A B C D E F

50. A B C D E F

51. A B C D E F

52. A B C D E F

53. A B C D E F

54. A B C D E F

55. A B C D E F

56. A B C D E F

57. A B C D E F

58. A B C D E F

59. A B C D E F

60. A B C D E F

61. A B C D E F

62. A B C D E F

63. A B C D E F

64. A B C D E F

65. A B C D E F

66. A B C D E F

67. A B C D E F

68. A B C D E F

69. A B C D E F

70. A B C D E F

71. A B C D E F

72. A B C D E F

73. A B C D E F

74. A B C D E F

75. A B C D E F

76. A B C D E F

77. A B C D E F

78. A B C D E F

79. A B C D E F

80. A B C D E F

81. A B C D E F

82. A B C D E F

83. A B C D E F

84. A B C D E F

85. A B C D E F

86. A B C D E F

87. A B C D E F

88. A B C D E F

89. A B C D E F

90. A B C D E F

91. A B C D E F

92. A B C D E F

93. A B C D E F

94. A B C D E F

95. A B C D E F

96. A B C D E F

97. A B C D E F

98. A B C D E F

99. A B C D E F

100. A B C D E F

101. A B C D E F

102. A B C D E F

103. A B C D E F

104. A B C D E F

105. A B C D E F

106. A B C D E F

107. A B C D E F

108. A B C D E F

109. A B C D E F

110. A B C D E F

111. A B C D E F

112. A B C D E F

113. A B C D E F

114. A B C D E F

115. A B C D E F

116. A B C D E F

117. A B C D E F

118. A B C D E F

119. A B C D E F

120. A B C D E F

121. A B C D E F

122. A B C D E F

123. A B C D E F

124. A B C D E F

125. A B C D E F

126. A B C D E F

127. A B C D E F

128. A B C D E F

129. A B C D E F

130. A B C D E F

131. A B C D E F

132. A B C D E F

133. A B C D E F

134. A B C D E F

135. A B C D E F

136. A B C D E F

137. A B C D E F

138. A B C D E F

139. A B C D E F

140. A B C D E F

141. A B C D E F

142. A B C D E F

143. A B C D E F

144. A B C D E F

145. A B C D E F

146. A B C D E F

147. A B C D E F

148. A B C D E F

149. A B C D E F

150. A B C D E F

151. A B C D E F

152. A B C D E F

153. A B C D E F

154. A B C D E F

155. A B C D E F

156. A B C D E F

157. A B C D E F

158. A B C D E F

159. A B C D E F

160. A B C D E F

161. A B C D E F

162. A B C D E F

163. A B C D E F

164. A B C D E F

165. A B C D E F

166. A B C D E F

167. A B C D E F

168. A B C D E F

169. A B C D E F

170. A B C D E F

171. A B C D E F

172. A B C D E F

173. A B C D E F

174. A B C D E F

175. A B C D E F

176. A B C D E F

177. A B C D E F

178. A B C D E F

179. A B C D E F

180. A B C D E F

181. A B C D E F

182. A B C D E F

183. A B C D E F

184. A B C D E F

185. A B C D E F

186. A B C D E F

187. A B C D E F

188. A B C D E F

189. A B C D E F

190. A B C D E F

191. A B C D E F

192. A B C D E F

193. A B C D E F

194. A B C D E F

195. A B C D E F

196. A B C D E F

197. A B C D E F

198. A B C D E F

199. A B C D E F

200. A B C D E F

201. A B C D E F

202. A B C D E F

203. A B C D E F

204. A B C D E F

205. A B C D E F

206. A B C D E F

207. A B C D E F

208. A B C D E F

209. A B C D E F

210. A B C D E F

211. A B C D E F

212. A B C D E F

213. A B C D E F

214. A B C D E F

215. A B C D E F

216. A B C D E F

217. A B C D E F

218. A B C D E F

219. A B C D E F

220. A B C D E F

221. A B C D E F

222. A B C D E F

223. A B C D E F

224. A B C D E F

225. A B C D E F

226. A B C D E F

227. A B C D E F

228. A B C D E F

229. A B C D E F

230. A B C D E F

231. A B C D E F

232. A B C D E F

233. A B C D E F

234. A B C D E F

235. A B C D E F

236. A B C D E F

237. A B C D E F

238. A B C D E F

239. A B C D E F

240. A B C D E F

241. A B C D E F

242. A B C D E F

243. A B C D E F

244. A B C D E F
245. A B C D E F
246. A B C D E F
247. A B C D E F
248. A B C D E F
249. A B C D E F
250. A B C D E F
251. A B C D E F
252. A B C D E F
253. A B C D E F
254. A B C D E F
255. A B C D E F
256. A B C D E F
257. A B C D E F
258. A B C D E F
259. A B C D E F
260. A B C D E F
261. A B C D E F
262. A B C D E F
263. A B C D E F
264. A B C D E F
265. A B C D E F
266. A B C D E F
267. A B C D E F
268. A B C D E F
269. A B C D E F
270. A B C D E F
271. A B C D E F
272. A B C D E F
273. A B C D E F
274. A B C D E F
275. A B C D E F
276. A B C D E F
277. A B C D E F
278. A B C D E F
279. A B C D E F
280. A B C D E F
281. A B C D E F
282. A B C D E F
283. A B C D E F
284. A B C D E F
285. A B C D E F
286. A B C D E F
287. A B C D E F
288. A B C D E F
289. A B C D E F
290. A B C D E F
291. A B C D E F
292. A B C D E F
293. A B C D E F
294. A B C D E F
295. A B C D E F
296. A B C D E F
297. A B C D E F
298. A B C D E F
299. A B C D E F
300. A B C D E F
301. A B C D E F
302. A B C D E F
303. A B C D E F
304. A B C D E F
305. A B C D E F
306. A B C D E F
307. A B C D E F
308. A B C D E F
309. A B C D E F
310. A B C D E F
311. A B C D E F
312. A B C D E F

313. A B C D E F
314. A B C D E F
315. A B C D E F
316. A B C D E F
317. A B C D E F
318. A B C D E F
319. A B C D E F
320. A B C D E F
321. A B C D E F
322. A B C D E F
323. A B C D E F
324. A B C D E F
325. A B C D E F
326. A B C D E F
327. A B C D E F
328. A B C D E F
329. A B C D E F
330. A B C D E F
331. A B C D E F
332. A B C D E F
333. A B C D E F
334. A B C D E F
335. A B C D E F
336. A B C D E F
337. A B C D E F
338. A B C D E F
339. A B C D E F
340. A B C D E F
341. A B C D E F
342. A B C D E F
343. A B C D E F
344. A B C D E F
345. A B C D E F
346. A B C D E F
347. A B C D E F
348. A B C D E F
349. A B C D E F
350. A B C D E F
351. A B C D E F
352. A B C D E F
353. A B C D E F
354. A B C D E F
355. A B C D E F
356. A B C D E F
357. A B C D E F
358. A B C D E F
359. A B C D E F
360. A B C D E F
361. A B C D E F
362. A B C D E F
363. A B C D E F
364. A B C D E F
365. A B C D E F
366. A B C D E F
367. A B C D E F
368. A B C D E F
369. A B C D E F
370. A B C D E F
371. A B C D E F
372. A B C D E F
373. A B C D E F
374. A B C D E F
375. A B C D E F
376. A B C D E F
377. A B C D E F
378. A B C D E F
379. A B C D E F
380. A B C D E F
381. A B C D E F

382. A B C D E F

383. A B C D E F

384. A B C D E F

385. A B C D E F

386. A B C D E F

387. A B C D E F

388. A B C D E F

389. A B C D E F

390. A B C D E F

391. A B C D E F

392. A B C D E F

393. A B C D E F

394. A B C D E F

395. A B C D E F

396. A B C D E F

397. A B C D E F

398. A B C D E F

399. A B C D E F

400. A B C D E F

401. A B C D E F

402. A B C D E F

403. A B C D E F

404. A B C D E F

405. A B C D E F

406. A B C D E F

407. A B C D E F

408. A B C D E F

409. A B C D E F

410. A B C D E F

411. A B C D E F

412. A B C D E F

413. A B C D E F

414. A B C D E F

415. A B C D E F

416. A B C D E F

417. A B C D E F

418. A B C D E F

419. A B C D E F

420. A B C D E F

421. A B C D E F

422. A B C D E F

423. A B C D E F

424. A B C D E F

425. A B C D E F

426. A B C D E F

427. A B C D E F

428. A B C D E F

429. A B C D E F

430. A B C D E F

431. A B C D E F

432. A B C D E F

433. A B C D E F

434. A B C D E F

435. A B C D E F

436. A B C D E F

437. A B C D E F

438. A B C D E F

439. A B C D E F

440. A B C D E F

441. A B C D E F

442. A B C D E F

443. A B C D E F

444. A B C D E F

445. A B C D E F

446. A B C D E F

447. A B C D E F

448. A B C D E F

449. A B C D E F

450. A B C D E F

451. A B C D E F

452. A B C D E F

453. A B C D E F

454. A B C D E F

455. A B C D E F

456. A B C D E F

457. A B C D E F

458. A B C D E F

459. A B C D E F

460. A B C D E F

461. A B C D E F

462. A B C D E F

463. A B C D E F

464. A B C D E F

465. A B C D E F

466. A B C D E F

467. A B C D E F

468. A B C D E F

469. A B C D E F

470. A B C D E F

471. A B C D E F

472. A B C D E F

473. A B C D E F

474. A B C D E F

475. A B C D E F

476. A B C D E F

477. A B C D E F

478. A B C D E F

479. A B C D E F

480. A B C D E F

481. A B C D E F

482. A B C D E F

483. A B C D E F

484. A B C D E F

485. A B C D E F

486. A B C D E F

487. A B C D E F

488. A B C D E F

489. A B C D E F

490. A B C D E F

491. A B C D E F

492. A B C D E F

493. A B C D E F

494. A B C D E F

495. A B C D E F

496. A B C D E F

497. A B C D E F

498. A B C D E F

499. A B C D E F

500. A B C D E F

Please e-mail or fax this survey along with your final exam

PUMPS 303 CEU COURSE
CUSTOMER SERVICE RESPONSE CARD

NAME: _____

E-MAIL_____PHONE_____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.

   Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.

   Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.

   Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

_____

_____

How about the price of the course?

Poor_____ Fair ____ Average ____ Good____ Great_____

How was your customer service?

Poor___ Fair ____ Average ____ Good _____ Great_____

Any other concerns or comments.

_____

_____

Please fax the answer key to
TLC Western Campus
Fax (928) 272-0747

You are responsible to ensure that TLC receives the Assignment and Registration Key.

Always call us after faxing the paperwork to ensure that we've received it.

Rush Grading Service
If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of $50.00.

Pumps 303 CEU Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e- mail it back to TLC.

You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular**. **Multiple Choice Section. One answer per question and please use the answer key.**

Hydraulics

1. Hydraulics is a branch of engineering concerned mainly with moving liquids.

A. True B. False

2. Hydraulics is applied commonly to the study of _____, other liquids, and even gases when the effects of compressibility are small.

A. Fluids
B. Hydrostatics
C. Hydrokinetics
D. Mechanical properties of water
E. Flow
F. None of the Above

3. Hydraulics can be divided into two areas, _____ and hydrokinetics.

A. Fluids
B. Hydrostatics
C. Hydrokinetics
D. Mechanical properties of water
E. Flow
F. None of the Above

4. Which of the following terms is about the pressures exerted by a fluid at rest?

A. Pressure
B. Hydrostatics
C. Hydrokinetics
D. Hydraulics
E. Flow
F. None of the Above

Section 3 - Fluid/Hydraulic Forces & Pressures Introduction

Atmospheric Pressure

5. Which of the following terms is the layer that extends upward for about 500 miles, the section of primary interest is the portion that rests on the earth's surface and extends upward for about 7 1/2 miles?

A. Column
B. Troposphere
C. Sea level
D. Mass
E. Atmospheric pressure
F. None of the Above

6. According the text, if a column of air 1-inch square extending all the way to the "atmosphere", this column of air would weigh approximately 2.31 pounds at sea level.

A. True B. False

7. Which of the following terms at sea level is approximately 14.7 psi?
A. Static pressure D. Bottom
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

8. If you were to ascend, the atmospheric pressure increases by approximately 1.0 psi for every 2,343 feet.
A. True B. False

9. Which of the following terms if you could be below, an example is in excavations and depressions, atmospheric pressure increases?
A. Static pressure D. Sea level
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

Barometric Loop
10. According to the text, the barometric loop, will provide protection against backsiphonage, is based upon the principle that a water column, at sea level pressure, will not rise above 33.9 feet. In general, barometric loops are locally fabricated, and are 35 feet high.
A. True B. False

11. Which of the following terms could be measured an absolute scale, pounds per square inch absolute, or gauge scale?
A. Static pressure D. Sea level
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

12. Absolute pressure is equal to gauge pressure plus the atmospheric pressure.
A. True B. False

13. The barometric loop consists of a continuous section of supply piping that abruptly rises to a height of approximately 233 feet and then returns back down to the originating level.
A. True B. False

14. Which of the following terms is the total pressure?
A. Static pressure D. Sea level
B. Absolute pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

15. Gauge pressure is simply the pressure read on the gauge. If there is no pressure on the gauge other than atmospheric, the gauge will read zero.
A. True B. False

16. Which of the following terms would be equal to 14.7 psi, which is the atmospheric pressure?
A. Static pressure D. Sea level
B. Absolute pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

Pressure

17. Water is incompressible, while air is very compressible.
A. True B. False

18. Both air and water are considered to be?
A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

19. Which of the following terms does water possess and air does not?
A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

20. A fluid is a substance that cannot exert any permanent forces tangential to a boundary and any force that it exerts on a boundary must be normal to the boundary.
A. True B. False

21. According to the text, a force is proportional to the_____, and is called a pressure.
A. Pascal's Principle D. Permanent forces tangential
B. Hydrostatics E. Area on which it is exerted
C. Acting on the body of the fluid F. None of the Above

22. In order for the fluid to be in equilibrium, the pressure must be the same in all directions (or the element would move in the direction of least pressure), and if no other forces are?
A. Pascal's Principle D. Permanent forces tangential
B. Hydrostatics E. Area on which it is exerted
C. Acting on the body of the fluid F. None of the Above

23. Therefore, in this case the pressure will be the same throughout the fluid, and the same in any direction at a point?
A. Pascal's Principle D. Permanent forces tangential
B. Hydrostatics E. Area on which it is exerted
C. Acting on the body of the fluid F. None of the Above

24. Which of the following terms that if a certain volume of fluid were somehow made solid, the equilibrium of forces would not be disturbed?
A. Axiom D. Displaced fluid
B. Gravitational body force E. Gravitation
C. Pressure F. None of the Above

25. Which of the following terms is an example of a body force that disturbs the equality of pressure in a fluid?
A. Axiom D. Displaced fluid
B. Gravitational body force E. Gravitation
C. Pressure F. None of the Above

26. When the barometric equation is integrated, we find the variation of pressure with?
A. Height or depth
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

Free Surface Perpendicular to Gravity

27. Archimedes' Principle says that the buoyant force is equal to the weight of the displaced fluid, and passes through the center of mass of?
A. Axiom
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

Standard Atmospheric Pressure

28. Which of the following terms is a practice that is conveniently used to measure pressure differences by measuring the height of liquid columns?
A. Barometer measurement
B. Total vacuum
C. Capillarity
D. Partial vacuum measurement
E. Manometer
F. None of the Above

29. Which of the following terms uses a partially evacuated chamber of thin metal that expands and contracts according to the external pressure?
A. Aneroid barometer
B. Total vacuum
C. Capillarity tube
D. Partial vacuum
E. Barometric loop
F. None of the Above

Vacuum

30. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the _____ is negative.
A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Atmospheric pressure
F. None of the Above

31. Which of the following terms would mean a pressure of 0 psia or –14.7 psig?
A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Atmospheric pressure
F. None of the Above

32. According to the text, it is impossible to produce a partial vacuum.
A. True B. False

33. Which of the following terms the pressure would range from slightly less than 14.7 psia to slightly greater than 0 psia?
A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Partial vacuum
F. None of the Above

34. Backsiphonage results from _____ exerted on a liquid, forcing it toward a supply system that is under a vacuum.
A. Static pressure D. Atmospheric pressure
B. Pressure E. Partial vacuum
C. Gauge pressure F. None of the Above

Water Pressure
35. The weight of a cubic foot of water is 62.4 pounds per square foot. The base can be subdivided into 144-square inches with each subdivision being subjected to a pressure of 0.433 psig. This is one of our key foundation for backflow prevention.
A. True B. False

36. Which of the following terms are normally stated in terms of the height of a fluid.
A. Friction D. Siphon
B. Weight E. Depth
C. Pressure(s) F. None of the Above

37. Water with a pressure head of 10 ft can provide the same _____as an equal amount of water raised by 10 ft.
A. Friction D. Siphon
B. Weight E. Energy
C. Pressure(s) F. None of the Above

38. Water flowing in a pipe is subject to head loss because of?
A. Friction D. Siphon
B. Weight E. Energy
C. Pressure(s) F. None of the Above

Pressure and Force
39. Which of the following terms is the force that pushes water through pipes?
A. Absolute pressure D. Volume
B. Pressure E. Shearing force
C. Fluid(s) F. None of the Above

40. Water pressure determines the flow of water from the tap.
A. True B. False

41. Which of the following terms and force are used extensively in the study of fluid power?
A. Absolute pressure D. Volume
B. Pressure E. Shearing force
C. Fluid(s) F. None of the Above

42. Which of the following terms means a total push or pull. It is the push or pull exerted against the total area of a particular surface?
A. Absolute pressure D. Volume
B. Pressure E. Force
C. Fluid(s) F. None of the Above

43. Which of the following terms means the amount of push or pull applied to each unit area of the surface?
A. Absolute pressure D. Volume
B. Pressure E. Force
C. Fluid(s) F. None of the Above

44. Which of the following terms maybe exerted in one direction, in several directions, or in all directions?
A. Absolute pressure D. Volume
B. Pressure E. Force
C. Fluid(s) F. None of the Above

Computing Force, Pressure, and Area
45. A formula is used in computing force, volume, and area in fluid power systems. In this formula, P refers to pressure, F indicates volume, and A represents area.
A. True B. False

Section 5 - Hydraulic Foundations and Theories
Early Development of Hydraulics
46. Which of the following terms to be made effective for practical applications, it was necessary to have a piston that "fit exactly?"
A. Pascal's law D. Aristotle' law
B. Evangelista Torricelli E. Archimedes' law
C. Blaise Pascal F. None of the Above

Section 6- Pumps and Pumping Water
General Pumping Fundamentals
47. Here are the important points to consider about suction piping when the liquid being pumped is below the level of the pump: Sometimes suction lift is also referred to as 'positive suction head'.
A. True B. False

48. According to the text, suction lift is when the level of water to be pumped is below the?
A. Impeller D. Centerline of the pump
B. Suction E. Bellows
C. Lift water F. None of the Above

49. According to the text, the ability of the pump to lift water is the result of a partial vacuum created at the?
A. Partial vacuum D. Pressure differential
B. Suction lift E. Negative suction head
C. Center of the pump F. None of the Above

50. The suction side of pipe should be one diameter smaller than the pump inlet.
A. True B. False

51. The required eccentric reducer should be turned so that the top is flat and the bottom tapered.
A. True B. False

The Basic Water Pump –Pump Operation

52. According to the text, the centrifugal pumps work by spinning water around in a circle inside a?
A. Vortex
B. Cylinder
C. Viscous drag pump
D. Center of the impeller
E. Cylindrical pump housing
F. None of the Above

53. The pump makes the water spin by pulling it with an impeller.
A. True B. False

54. The blades of this impeller project inward from an axle like the arms of a turnstile and, as the impeller spins, the water moves through it.
A. True B. False

55. In a centrifugal pump, the water pressure at the edge of the turning impeller rises until it is able to keep water circling with the?
A. Centrifugal pump(s)
B. Impeller blade(s)
C. Bernoulli's equation
D. Diaphragm pump(s)
E. Cylindrical pump housing
F. None of the Above

56. In a centrifugal pump, as water drifts outward between the _____ of the pump, it must move faster and faster because its circular path is getting larger and larger.
A. Centrifugal pump(s)
B. Impeller blade(s)
C. Bernoulli's equation
D. Diaphragm pump(s)
E. Cylindrical pump housing
F. None of the Above

57. As the water slows down and its kinetic energy decreases, that water's pressure potential energy increases.
A. True B. False

58. As the water spins, the pressure near the outer edge of the pump housing becomes much lower than near the center of the impeller.
A. True B. False

59. The impeller blades cause the water to move faster and faster.
A. True B. False

60. The impellers may be of either a semi-open or closed type.
A. True B. False

61. According to the text, without an inward force, an object will travel in a straight line and will not complete the?
A. Circle
B. Pump pushes
C. Viscous drag pump
D. Center of the impeller
E. Incompressible fluid
F. None of the Above

62. In a centrifugal pump, the inward force is provided by high-pressure water near the outer edge of the?
A. Centrifugal pump(s)
B. Impeller blade(s)
C. Pump housing
D. Diaphragm pump(s)
E. Cylindrical pump housing
F. None of the Above

63. In the operation of the pump, the water at the edge of the _____ inward on the water between the impeller blades and makes it possible for that water to travel in a circle.
A. Inward force
B. Pump pushes
C. Viscous drag pump
D. Center of the impeller
E. Incompressible fluid
F. None of the Above

64. In the operation of the pump, when water is actively flowing through the pump, arriving through a hole near the center of the impeller and leaving through a _____ near the outer edge of the pump housing, the pressure rise between center and edge of the pump is not as large.
A. Centrifugal pump(s)
B. Impeller blade(s)
C. Hole
D. Diaphragm pump(s)
E. Cylindrical pump housing
F. None of the Above

Key Terms

65. Which of the following key terms is a measure of a liquid's resistance to flow. i.e.: how thick it is?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

66. Which of the following key terms is the weight of liquid in comparison to water at approx. 20 degrees C?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

67. Which of the following key terms is a number that is the function of pump flow, head, efficiency?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

68. Which of the following key terms determines the type of pump used, the speed it can run at, and with gear pumps, the internal clearances required?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

69. Which of the following key terms is the amount of pressure / head required to 'force' liquid through pipe and fittings?
A. NPSH
B. Specific Speed
C. Viscosity
D. Friction Loss
E. Vapor Pressure
F. None of the Above

70. Which of the following key terms is related to how much suction lift a pump can achieve by creating a partial vacuum?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

71. Which of the following key terms is related to how a liquid is greater than the surrounding air pressure, the liquid will boil?
A. NPSH
B. Specific Speed
C. Viscosity
D. S.G.: Specific gravity
E. Vapor Pressure
F. None of the Above

Plunger Pump
72. The plunger pump cannot be used for heavy sludge.
A. True B. False

73. The plunger pump is a positive displacement pump that uses a _____to force liquid from the suction side to the discharge side of the pump.
A. Plunger pump
B. Mixed flow
C. Dynamic
D. Discharge tube
E. Plunger or piston
F. None of the Above

74. According to the text, the movement of the plunger or piston inside the pump creates pressure inside the pump, never operated against any?
A. Inward force
B. Pump pushes
C. Viscous drag pump
D. Closed discharge valve
E. Incompressible fluid
F. None of the Above

75. Which of the following terms must be open before the pump is started, to prevent any fast build-up of pressure that could damage the pump?
A. Inward force
B. Discharge valves
C. Viscous drag pump
D. Center of the impeller
E. Incompressible fluid
F. None of the Above

Diaphragm Pumps
76. Which of the following terms provides the mechanical action used to force liquid from the suction to the discharge side of the pump?
A. Centrifugal pump(s)
B. Impeller blade(s)
C. Bernoulli's equation
D. Diaphragm
E. Cylindrical pump housing
F. None of the Above

77. Which of the following terms has an advantage that this pump does not come in contact with moving metal?
A. Plunger pump
B. Mixed flow
C. Dynamic
D. Diaphragm
E. Plunger or piston
F. None of the Above

There are three main types of diaphragm pumps:
78. In the first type, the _____with one side in the fluid to be pumped, and the other in air or hydraulic fluid.
A. Vapor bubbles
B. Chamber pressure
C. Drive shaft
D. Volumetric positive displacement
E. Diaphragm is sealed
F. None of the Above

79. The diaphragm is flexed, causing the volume of the pump chamber to increase and decrease.
A. True B. False

80. A pair of _____prevents reverse flow of the fluid.
A. Strainers D. Non-return check valves
B. Diaphragms E. Check valves
C. Springs F. None of the Above

81. The second type of diaphragm pump works with volumetric positive displacement, but differs in that the prime mover of the diaphragm is neither oil nor air; but is?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Reverse direction
C. Electro-mechanical F. None of the Above

82. The third type of diaphragm pump has one or more springs with the fluid to be pumped on both sides.
A. True B. False

83. According to the text, when the volume of a chamber of either type of pump is increased (the diaphragm moving up), the pressure decreases, and fluid is drawn into the?
A. Chamber D. Keyway and nut
B. Diaphragm E. Time delay or ratchet assembly
C. Inertial cavitation F. None of the Above

84. Which of the following terms expresses pressure later increases from decreased volume (the diaphragm moving down), the fluid previously drawn in is forced out?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber E. Diaphragm
C. Drive shaft F. None of the Above

85. Which of the following terms expresses moving up once again draws fluid into the Chamber, completing the cycle?
A. Spring D. Keyway and nut
B. Diaphragm E. Time delay or ratchet assembly
C. Inertial cavitation F. None of the Above

Pump Categories
86. The key to understanding a pumps operation is that a pump is to move water and generate the _____ we call pressure.
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Delivery force F. None of the Above

87. Pump operation like with a centrifugal pump — pressure is not referred to in pounds per square inch but rather as the equivalent in elevation, called?
A. Inward force D. Center of the impeller
B. Head E. Incompressible fluid
C. Viscous drag pump F. None of the Above

88. According to the text, pumps may be classified on the basis of the application they serve.
A. True B. False

89. According to the text, all pumps may be divided into two major categories: (1) dynamic and (2)?
A. Centrifugal D. Diaphragm
B. Impeller E. Rotary
C. Displacement F. None of the Above

Common Types of Water Pumps

90. The water production well industry almost exclusively uses turbine pumps, which are a type of centrifugal pump.
A. True B. False

91. The most common type of water pumps used for municipal and domestic water supplies are?
A. Axial flow D. Turbine pump(s)
B. Submersible E. Variable displacement pumps
C. Rotary pump F. None of the Above

92. Which of the following terms will produce at different rates relative to the amount of pressure or lift the pump is working against?
A. Variable displacement pump D. Single or multiple bowls
B. Drive shaft E. Pump's lifting capacity
C. Column pipe F. None of the Above

93. Which of the following terms are variable displacement pumps that are by far used the most?
A. Axial flow D. Turbine pump(s)
B. Submersible E. Centrifugal pumps
C. Rotary pump F. None of the Above

94. According to the text, the turbine pump utilizes impellers enclosed in single or multiple bowls or stages to?
A. Lift water D. Single or multiple bowls
B. Drive shaft E. Pump's lifting capacity
C. Column pipe F. None of the Above

95. Vertical turbine pumps are commonly used in groundwater wells.
A. True B. False

96. The shaft turns the impellers within the pump housing while the?
A. Spider bearing(s) D. Water moves up the column
B. Horsepower turns the shaft E. Desired pumping rate is obtained
C. Impeller(s) F. None of the Above

97. Impellers are rotated by the pump motor, which provides the _____ needed to overcome the pumping head.
A. Spider bearing(s) D. Turbine pump(s)
B. Horsepower E. Desired pumping rate
C. Impeller(s) F. None of the Above

98. The size and number of stages, horsepower of the motor and _____are the key components relating to the pump's lifting capacity.
A. Pumping head D. Single or multiple bowls
B. Drive shaft E. Pump's lifting capacity
C. Column pipe F. None of the Above

99. The rotating shaft in a line shaft turbine is housed within the column pipe that delivers the water to the surface.
A. True B. False

100. The size of the _____are selected based on the desired pumping rate and lift requirements.
A. Spider bearing(s) D. Column, impeller, and bowls
B. Horsepower E. Desired pumping rate
C. Impeller(s) F. None of the Above

101. According to the text, column pipe sections can be threaded or coupled together while the drive shaft is coupled and suspended within the column by?
A. Oil tube D. Single or multiple bowls
B. Spider bearings E. Pump's lifting capacity
C. Column pipe F. None of the Above

102. The water passing through the column pipe serves as the lubricant for the bearings.
A. True B. False

103. Which of the following terms, provide both a seal at the column pipe joints and keep the shaft aligned within the column?
A. Spider bearing(s) D. Roller bearings
B. Keyway E. Lantern rings
C. Impeller(s) F. None of the Above

104. Some vertical turbines are lubricated by oil rather than water. These pumps are essentially the same as_____; only the drive shaft is enclosed within an oil tube.
A. Oil tube D. Single or multiple bowls
B. Water lubricated units E. Pump's lifting capacity
C. Column pipe F. None of the Above

105. The oil tube is suspended within the column by_____, while the line shaft is supported within the oil tube by brass or redwood bearings.
A. Oil tube D. Single or multiple bowls
B. Spider flanges E. Pump's lifting capacity
C. Column pipe F. None of the Above

106. A continuous supply of _____the drive shaft as it proceeds downward through the oil tube.
A. Spider bearing(s) D. Turbine pump(s)
B. Oil lubricates E. Desired pumping rate
C. Impeller(s) F. None of the Above

107. A small hole located at the top of the _____allows excess oil to enter the well. This results in the formation of an oil film on the water surface within oil-lubricated wells.
A. Pump bow unit
B. Drive shaft
C. Column pipe
D. Single or multiple bowls
E. Pump's lifting capacity
F. None of the Above

108. Careful operation of oil lubricated turbines is needed to ensure that the pumping levels do not drop enough to allow oil to enter the pump.
A. True B. False

109. According to the text, water and oil lubricated turbine pump units can be driven by?
A. Gears
B. Drive shaft
C. Column pipe
D. Electric or fuel powered motors
E. Pump's lifting capacity
F. None of the Above

110. Often an electric motor that is connected to the _____by a keyway and nut.
A. Drive shaft
B. Rotor
C. Inboard
D. Sprocket
E. Time delay or ratchet assembly
F. None of the Above

111. Where electricity is not readily available, fuel powered engines may be connected to the drive shaft by a?
A. Gear
B. Lantern ring
C. Drive shaft
D. Volumetric positive displacement
E. Right angle drive gear
F. None of the Above

112. Oil and water lubricated systems will have a strainer attached to the _____to prevent sediment from entering the pump.
A. Intake
B. Diaphragm
C. Inboard
D. Lantern ring
E. Sump
F. None of the Above

113. Which of the following terms: water flowing back down the column, turning the impellers in a reverse direction?
A. Vapor bubbles are created
B. Chamber pressure
C. Drive shaft is off
D. Volumetric positive displacement is turned off
E. Line shaft turbine is turned off
F. None of the Above

114. Time delays or ratchet assemblies are often installed on these motors to either prevent the motor from turning on before _____stops or simply not allow it to reverse at all.
A. Reverse rotation
B. Diaphragm
C. Inertial cavitation
D. Keyway and nut
E. Time delay or ratchet assembly
F. None of the Above

Cavitation
115. According to the text, cavitation is defined as the phenomenon of formation of vapor bubbles of a flowing liquid in a region where the pressure of the liquid falls below its?
A. Vapor bubbles
B. Chamber pressure
C. Drive shaft
D. Volumetric positive displacement
E. Vapor pressure
F. None of the Above

116. Cavitation is usually divided into two classes of behavior: inertial (or transient) cavitation and?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Non-inertial cavitation
C. Drive shaft F. None of the Above

117. Which of the following terms is the process where a void or bubble in a liquid rapidly collapses, producing a shock wave?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Reverse direction
C. Inertial cavitation F. None of the Above

118. Which of the following terms often occurs in pumps, propellers, impellers, and in the vascular tissues of plants?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Reverse direction
C. Cavitation F. None of the Above

119. The cavitation pits increase the turbulence of the fluid flow and create crevasses that act as nucleation sites for?
A. Cause water hammer D. Additional cavitation bubbles
B. Cause residual stresses E. Collapse of cavities
C. Cause shock waves F. None of the Above

120. The pits also increase the component's surface area and leave behind residual stresses making the surface more prone to?
A. Cause water hammer D. Stress corrosion
B. Cause residual stresses E. Collapse of cavities
C. Cause shock waves F. None of the Above

121. Which of the following terms is the process in which a bubble in a fluid is forced to oscillate in size or shape due to some form of energy input, such as an acoustic field?
A. Strainer D. Non-inertial cavitation
B. Diaphragm E. Time delay or ratchet assembly
C. Cavitation F. None of the Above

122. According to the text, cavitation is, in many cases, an undesirable occurrence. In devices such as propellers and pumps, cavitation causes a great deal of _____, vibrations, and a loss of efficiency.
A. Cavitation D. Propellers and pumps
B. Turbulence E. Noise, damage to components
C. Driveshaft F. None of the Above

123. Which of the following terms forces liquid energy into very small volumes, thereby creating spots of high temperature and emitting shock waves, the latter of which are a source of noise?
A. Suction side D. Cavitation bubbles collapse
B. Residual stresses E. Collapse of cavities
C. Shock waves F. None of the Above

124. According to the text, although the collapse of a cavity is a relatively low-energy event, highly localized collapses can?
A. Cause water hammer D. Erode metals
B. Cause residual stresses E. Collapse of cavities
C. Cause shock waves F. None of the Above

125. The pitting caused by the collapse of cavities produces great wear on components and can dramatically shorten a propeller's or pump's lifetime.
A. True B. False

Pump Glossary
126. Which of the following definitions is a mechanical device that seals the pump stuffing box?
A. Packing D. Mechanical seal
B. Bearing E. Lantern ring
C. Seal F. None of the Above

127. Which of the following definitions is a pump that uses both axial-flow and radial-flow components in one impeller?
A. Bellows D. Dynamic
B. Mixed flow pump E. Diaphragm pump
C. Kinetic energy F. None of the Above

128. Which of the following definitions is a flat material that is compressed between two flanges to form a seal?
A. Gasket D. Seal
B. Keyway E. Bond
C. Packing F. None of the Above

129. Which of the following definitions is a line that directs sealing fluid to the stuffing box?
A. Leak-off D. Lantern ring
B. Gland sealing line E. Gland follower
C. Horizontal line F. None of the Above

130. Which of the following definitions is the part of the pump that increases the speed of the fluid being handled?
A. Packing D. Seal
B. Impeller E. Outboard
C. Inboard F. None of the Above

131. Which of the following definitions is the area on the shaft that accepts the key?
A. Gasket D. Inter-stage diaphragm
B. Keyway E. Kinetic energy
C. Energy F. None of the Above

132. Which of the following definitions is any substance that can be pumped such as oil, water, refrigerant, or even air?
A. Fluid D. Substance
B. Mixed flow pump E. Flow
C. Energy F. None of the Above

133. Which of the following definitions is the end of the pump closest to the motor?
A. Packing D. Bowl
B. Impeller E. Outboard
C. Inboard F. None of the Above

134. Which of the following definitions is the energy associated with motion?
A. Soft start D. Flow
B. Phase E. Kinetic energy
C. Energy F. None of the Above

135. Which of the following definitions is bushing at the bottom of the stuffing box that prevents packing from being pushed out of the stuffing box into the suction eye of the impeller?
A. Strainer D. Stuffing box
B. Suction E. Throat bushing
C. Suction eye F. None of the Above

136. Which of the following definitions is force, usually along the center line of the pump?
A. Thrust D. Vertical power
B. Pressure E. Energy
C. Suction F. None of the Above

137. Which of the following definitions is a metal ring located between rings of packing that distributes gland sealing fluid?
A. Leak-off D. Lantern ring
B. Gland sealing line E. Gland follower
C. Horizontal packing F. None of the Above

138. Which of the following definitions is the fluid that leaks from the stuffing box?
A. Leak-off D. Lantern ring
B. Gland sealing leakage E. Gland follower
C. Horizontal leakage F. None of the Above

139. Which of the following definitions is a bushing used to compress the packing in the stuffing box and to control leakoff?
A. Leak-off packing D. Lantern ring
B. Gland sealing line E. Gland follower
C. Horizontal packing F. None of the Above

140. Which of the following definitions are pumps in which the centerline of the shaft runs vertically?
A. Thrusters D. Vertical pumps
B. Vanes E. Double pumps
C. Suction pumps F. None of the Above

141. Which of the following definitions are pumps with more than one impeller?
A. Turbine D. Multi-stage pumps
B. Mixed flow E. Outboard
C. Inboard F. None of the Above

142. Which of the following definitions is the end of the pump farthest from the motor?
A. Outlet D. Exit
B. Impeller E. Outboard
C. Inboard F. None of the Above

143. Which of the following definitions is the soft, pliable material that seals the stuffing box?
A. Packing D. Glands
B. Rubbers E. Mechanical seal
C. Gaskets F. None of the Above

144. Which of the following definitions are replaceable tubular coverings on the shaft?
A. Protectors D. Shaft sleeve
B. Shrouds E. Stages
C. Covers F. None of the Above

145. Which of the following definitions is the metal covering over the vanes of an impeller?
A. Slop drain D. Shaft sleeve
B. Shroud E. Stages
C. Slurry F. None of the Above

146. Which of the following definitions is the drain from the area that collects leak-off from the stuffing box?
A. Slop drain D. Shaft sleeve
B. Shroud E. Stages
C. Slurry drain F. None of the Above

147. Which of the following definitions is the part of the pump that changes the speed of the fluid into pressure?
A. Thrust D. Vertical pumps
B. Vanes E. Volute
C. Suction eye F. None of the Above

148. Which of the following definitions are the replaceable rings on the impeller or the casing that wear as the pump operates?
A. Seals D. Glands
B. Vanes E. Wearing rings
C. Packing glands F. None of the Above

149. Which of the following definitions is a nut that keeps the parts in place?
A. Lock nut D. Radial bearings
B. Keyway E. Retaining nut
C. Cotter F. None of the Above

150. Which of the following definitions are the rotating parts, usually including the impeller, shaft, bearing housings, and all other parts included between the bearing housing and the impeller?
A. Inboard D. Flow parts
B. Rotor E. Retaining parts
C. Mechanical F. None of the Above

Section 7 - Complicated Pumps

Types of Pumps

151. The family of pumps comprises a large number of types based on application and capabilities. The two major groups of pumps are?

A. Plunger and bicycle pump
B. Mixed flow and single
C. Dynamic and radical
D. Discharge and radical displacement
E. Dynamic and positive displacement
F. None of the Above

Positive Displacement Pumps

152. A positive displacement pump has an expanding cavity on the _____of the pump and a decreasing cavity on the discharge side.

A. Plunger pump
B. Suction side
C. Dynamic
D. Discharge tube
E. Roots blower
F. None of the Above

153. According to the text, liquid is allowed to flow into the pump as the cavity on the suction side expands and the liquid is forced out of the?

A. Cylinder
B. Chamber
C. Radial flow
D. Cavity
E. Discharge
F. None of the Above

154. This principle applies to all types of Positive Displacement Pumps whether the pump is a rotary lobe, gear within a gear, piston, diaphragm, screw, and?

A. Plunger pump
B. Mixed flow
C. Dynamic
D. Progressing cavity
E. Roots blower
F. None of the Above

155. A Positive Displacement Pump, unlike a Centrifugal Pump, will produce the same flow at a given RPM no matter what the discharge pressure is.

A. True B. False

156. Which of the following terms cannot be operated against a closed valve on the discharge side of the pump?

A. Bicycle
B. Bellows
C. Radial flow
D. Centrifugal
E. Positive Displacement Pump(s)
F. None of the Above

157. If a Positive Displacement Pump is allowed to operate against a closed discharge valve it will continue to produce flow that will increase the pressure in the discharge line until either the line bursts or the pump is severely damaged or both.

A. True B. False

Complicated Pumps - Introduction

158. Pumps are excellent examples of?

A. Hydrostatics
B. Quasi-static
C. Oscillating diaphragm
D. Multi-stage pumps
E. Complicated part
F. None of the Above

159. Pumps are of two general types, _____ or positive displacement pumps, and pumps depending on dynamic forces, such as centrifugal pumps.
A. Hydrostatic
B. Quasi-static
C. Oscillating diaphragm
D. Hydrostatic considerations
E. Complicated part
F. None of the Above

160. Positive displacement pumps have a piston (or equivalent) moving in a closely fitting cylinder and forces are exerted on the fluid by motion of the piston.
A. True B. False

161. More complicated pumps have valves check valves that open to allow _____, and close automatically to prevent reverse flow.
A. Pistons
B. Diaphragms
C. Discharged fluid
D. Passage in one direction
E. Lift pumps
F. None of the Above

162. There are many kinds of_____, and can be the most trouble-prone and complicated part of a pump.
A. Rotors
B. Force pumps
C. Inlets
D. Air space
E. Valves
F. None of the Above

163. According to the text, the force pump has _____in the cylinder, one for supply and the other for delivery.
A. Two check valves
B. Diaphragms
C. Rotors
D. Cylinders
E. Lift pumps
F. None of the Above

164. The supply valve opens when the cylinder_____, the delivery valve when the cylinder volume decreases.
A. Rotor
B. Force pump
C. Volume decreases
D. Air space
E. Volume increases
F. None of the Above

165. According to the text, the lift pump has a _____and a valve in the piston that allows the liquid to pass around it when the volume of the cylinder is reduced.
A. Supply valve
B. Diaphragm
C. Discharged fluid
D. Cylinder
E. Lift pumps
F. None of the Above

166. The delivery in this case is from the upper part of the_____, which the piston does not enter.
A. Rotor
B. Force pump
C. Volume decreases
D. Air space
E. Cylinder
F. None of the Above

167. Diaphragm pumps are force pumps in which the oscillating diaphragm takes the place of the piston.
A. True B. False

168. Which of the following terms may be moved mechanically, or by the pressure of the fluid on one side of the diaphragm?
A. Piston D. Cylinder
B. Diaphragm E. Lift pumps
C. Discharged fluid F. None of the Above

169. Which of the following terms are typically used for water?
A. Bellows D. Force and lift pumps
B. Force pumps E. Delivery pumps
C. Volume pumps F. None of the Above

170. The force pump has two valves in the cylinder, while the lift pump has one valve in the cylinder and one in the piston.
A. True B. False

171. Which of the following terms is determined by the atmospheric pressure, and either cylinder must be within this height of the free surface?
A. Suction D. Discharge
B. Diaphragm E. Force
C. Discharged fluid F. None of the Above

172. The force pump can give an arbitrarily large pressure to the _____, as in the case of a diesel engine injector.
A. Rotor D. Air space
B. Discharged fluid E. Delivery
C. Volume decreases F. None of the Above

Centrifugal Pump Section
173. A Centrifugal pump is a machine that imparts energy to a fluid. This energy infusion can cause a liquid to flow, rise to a higher level, or both.
A. True B. False

174. The centrifugal pump is an extremely simple machine. It is a member of a family known as rotary machines and consists of two basic parts: 1) the rotary element or impeller and 2) the stationary element or?
A. Staging D. Lantern ring spacer
B. Eye E. Casing (volute)
C. Pressure F. None of the Above

175. In operation, a centrifugal pump "_____" liquid out of the impeller via centrifugal force. One fact that must always be remembered:
A. Web of the ring D. Vapor bound
B. Slings E. Single-stage pump
C. Pump shaft F. None of the Above

176. A pump does not create pressure; it only provides flow. Pressure is just an indication of the amount of?
A. Staging D. Resistance to flow
B. Eye E. Recirculation lines
C. Pressure F. None of the Above

177. Centrifugal pumps are also classified as HORIZONTAL or VERTICAL, depending upon the position of the pump shaft.
A. True B. False

178. Centrifugal pumps may be classified as either SINGLE STAGE or MULTI-STAGE.
A. True B. False

179. A multi-stage pump has one impellers housed together in two casings.
A. True B. False

180. Which of the following terms has only one impeller?
A. Axial D. Multi-stage
B. Closed pumps E. Single-stage pump
C. Double suction F. None of the Above

181. The impellers used on centrifugal pumps may be classified as?
A. By the volute D. Single or double suction
B. Open or Closed E. Single-stage pump
C. The type of driver F. None of the Above

182. The single-suction impeller allows liquid to enter the eye from one side only. The double-suction impeller allows liquid to enter the _____ from two directions.
A. Staging D. Volute
B. Eye E. Recirculation line
C. Pressure F. None of the Above

183. Which of the following terms are classified as Closed or Open?
A. Webs D. Impellers
B. Volutes E. Single-stage pumps
C. Dynamic pumps F. None of the Above

184. Which of the following terms have sidewalls that extend from the eye to the outer edge of the vane tips?
A. Staging D. Closed impellers
B. Eyes E. Recirculation lines
C. Pressure vanes F. None of the Above

185. Some small pumps with single-suction impellers have only a casing wearing ring and no?
A. Staging D. Lantern ring spacer
B. Eye E. Recirculation lines
C. Impeller ring F. None of the Above

186. Which of the following terms are installed on some centrifugal pumps to prevent the pumps from overheating and becoming vapor bound?
A. Air relief D. Recirculation lines
B. Foot valve E. Single-stage pump
C. Pump shaft F. None of the Above

187. Which of the following terms is installed to cool the shaft and the packing, to lubricate the packing, and to seal the rotating joint between the shaft and the packing against air leakage?
A. Staging D. Lantern ring spacer
B. Eye E. Water jet
C. Seal piping F. None of the Above

188. Which of the following terms is inserted between the rings of the packing in the stuffing box?
A. Web of the ring D. Mechanical seal
B. Lantern ring spacer E. Bearings
C. Pump shaft F. None of the Above

189. According to the text, seal piping leads the liquid from the discharge side of the pump to the annular space formed by the?
A. Staging D. Lantern ring spacer
B. Eye E. Volute
C. Lantern ring F. None of the Above

Pump Casing
190. The most common type of centrifugal pump is an end suction pump.
A. True B. False

191. Another type of centrifugal pump used is the split case.
A. True B. False

192. The line shaft turbine is really a single stage centrifugal pump.
A. True B. False

193. There are many variations of split case, such as; two-stage, single suction, and?
A. Radial flow impellers D. Mixed media
B. Double suction E. Multi media
C. Parallel F. None of the Above

Impeller
194. In most centrifugal pumps, the impeller looks like a number of cupped vanes on blades mounted on?
A. Radial flow impellers D. Cupped vanes on blades
B. Axial flow impellers E. Disc or shaft
C. Parallel to the shaft F. None of the Above

195. As the water is being thrown out of the pump, this means you can run centrifugal pumps with the discharged valve closed for a long period of time.
A. True B. False

196. The impellers all cause a flow from the eye of the impeller to the outside of the impeller.
A. True B. False

197. According to the text, some impellers cause what is called_____, and they can be referred to as radial flow impellers.
A. Radial flow impellers
B. Axial flow impellers
C. Parallel to the shaft
D. Radial flow
E. Shape of the vanes
F. None of the Above

198. Which of the following terms of the impeller and how it is installed in the casing will determine if it is high volume / low pressure or the type of liquid that could be pumped?
A. Shape of the vanes
B. Line shaft turbine
C. Parallel to the shaft
D. Critical distance
E. Discharge piping outlet
F. None of the Above

199. Which of the following terms looks like a propeller and create a flow that is parallel to the shaft?
A. Radial flow impellers
B. Axial flow impellers
C. Parallel to the shaft
D. Cupped vanes on blades
E. Shape of the vanes
F. None of the Above

Screw or Auger Pump
200. The machine consists of a screw inside a hollow pipe. Some attribute its invention to Archimedes while others attribute it to Nebuchadnezzar II, the screw can be thought of as?
A. Casing
B. Screw
C. Stair case
D. An inclined plane
E. Spiral tube
F. None of the Above

201. Which of the following is turned as the bottom end of the tube turns, it scoops up a volume of water?
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Spiral tube
F. None of the Above

202. According to the text, an amount of water will slide up in the spiral tube as the _____is turned, until it finally pours out from the top of the tube and feeds the irrigation system.
A. Casing
B. Screw
C. Suction side
D. Shaft
E. Spiral tube
F. None of the Above

203. The contact surface between the screw and the pipe does not need to be perfectly water-tight because of the relatively large amount of water being scooped at each turn with respect to the?
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Angular speed of the screw
F. None of the Above

204. Water leaking from the top section of the _____ will leak into the previous one and so on.
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Spiral tube
F. None of the Above

205. Which of the following terms is related to how does it turn inside the casing, but can be allowed to turn with it in one piece?
A. Casing D. Equilibrium
B. Screw E. Spiral tube
C. Suction side F. None of the Above

206. A large screw provides the mechanical action to move the liquid from the suction side to the?
A. Casing D. Discharge side of the pump
B. Screw E. Spiral tube
C. Suction side F. None of the Above

207. Which of the following terms can rotate in the 30 to 60 rpm range, although some pumps are faster?
A. Casing D. Equilibrium
B. Screw pumps E. Spiral tube
C. Suction side F. None of the Above

208. The slope of the _____ is normally either 30° or 38°.
A. Casing D. Equilibrium
B. Screw E. Spiral tube
C. Suction side F. None of the Above

209. The maximum lift for the larger diameter pumps is about 300 feet.
A. True B. False

Progressing Cavity Pump Section
210. In the progressing cavity pump, components referred to as a rotor and an elastic stator provide the collapse of cavities used to force liquid from the suction side to the discharge side of the pump.
A. True B. False

211. The progressive cavity pump can be run dry, because there is no friction between the rotor and stator will quickly damage the pump.
A. True B. False

212. According to the text, as the rotor turns within the stator, cavities are formed which progress from the suction to the _____, conveying the pumped material.
A. Cavitation D. Discharge end of the pump
B. Turbulence E. Center of rotation
C. Driveshaft F. None of the Above

213. Which of the following terms between the rotor and the stator helices keeps the fluid moving steadily at a fixed flow rate proportional to the pump's rotational speed?
A. Suction side D. Pump casing
B. Residual stresses E. Continuous seal
C. Shock waves F. None of the Above

214. Which of the following terms are used to pump material very high in solids content?
A. Suction side D. Pump casing
B. Residual stresses E. Collapse of cavities
C. Progressing cavity pumps F. None of the Above

More on the Progressive Cavity Pump

215. A progressive cavity pump is also known as a progressing cavity pump, eccentric screw pump, or even just?

A. Drag, or friction pump
B. Helical shaft pump
C. Cavity pump
D. High pressure pump
E. Eccentric screw pump
F. None of the Above

216. This type of pump transfers fluid by means of the progress, through the pump, of a sequence of small, fixed shape, discrete cavities, as its?

A. Flow rate
B. Hypocycloids
C. Piston pump
D. Rotor is turned
E. Peristaltic pump(s)
F. None of the Above

217. Which of the following terms being proportional to the rotation rate and to low levels of shearing being applied to the pumped fluid?

A. Drag, or friction
B. Volumetric flow rate
C. Cavities
D. High pressure
E. Eccentric screw pump
F. None of the Above

218. Progressive Cavity Pumps have application in fluid metering and pumping of viscous or shear sensitive materials.

A. True B. False

219. With the Progressive Cavity Pump, there no flow pulsing is caused by the arrival of_____, other than that caused by compression of the fluid or pump components.

A. Flow rate
B. Hypocycloids
C. Piston pump
D. Pump size
E. Cavities at the outlet
F. None of the Above

220. With the Progressive Cavity Pump, the principle of this _____is due to a dynamic effect caused by drag, or friction against the moving teeth of the screw rotor.

A. Drag, or friction
B. Helical shaft
C. Cavities
D. High pressure
E. Pumping technique
F. None of the Above

221. In reality it is due to sealed cavities, being able to pump at extremely low rates, even to high pressure, revealing the effect to be purely?

A. Flow rate
B. Hypocycloids
C. Piston pump
D. Pump size
E. Positive displacement
F. None of the Above

222. The mechanical layout that causes the cavities to, uniquely, be of fixed dimensions as they move through the pump, the shape of the gap formed between a helical shaft and a two start, twice the wavelength and double the diameter, helical hole, as the shaft is "_____" around the inside surface of the hole.

A. Dragged
B. Helical rolled
C. Rolled
D. Turned
E. Eccentrically screwed
F. None of the Above

223. The motion of the rotor being the same as the smaller gears of a planetary gears system. This form of motion gives rise to the curves called?
A. Flow rate D. Pump curves
B. Hypocycloids E. Peristaltic curves
C. Piston pump F. None of the Above

224. With the Progressive Cavity Pump, in order to produce a seal between cavities, the rotor so takes a form similar to a corkscrew, and this, combined with the off-center rotary motion
A. True B. False

225. Which of the following terms and various Rotor/stator pitch ratios exist, but are specialized in that they don't generally allow complete sealing?
A. Flow rate D. Pump size
B. Speeds E. Different rotor shapes
C. Drivers F. None of the Above

226. At a high enough pressure the sliding seals between _____will leak some fluid rather than pumping it?
A. Drag, or friction D. High pressure
B. Helical shaft E. Eccentric screw pump
C. Cavities F. None of the Above

227. In operation, progressive cavity pumps are fundamentally fixed flow rate pumps, like piston pumps and?
A. Flow rate D. Pump size
B. Hypocycloids E. Peristaltic pump(s)
C. Piston pump F. None of the Above

228. With the Progressive Cavity Pump, needs a fundamentally different understanding to the types of pumps to which people are more commonly first introduced, namely ones that can be thought of as generating a?
A. Drag, or friction D. Pressure
B. Helical shaft E. Force
C. Motor F. None of the Above

229. According to the text, pumps are often fitted with cut-off pressure switches, burst disks or a bypass pipe that allows a variable amount of a fluid to return to the inlet.
A. True B. False

230. Which of the following terms is there a fixed flow rate pump is effectively converted to a fixed pressure one?
A. Drag, or friction D. Double pump
B. Centrifugal E. Dynamic pump
C. Bypass fitted F. None of the Above

231. Which of the following terms refers to where the rotor touches the stator, the surfaces are generally traveling transversely, small areas of sliding contact occur, these areas need to be lubricated by the fluid being pumped?
A. Torque D. Hydrodynamic lubrication
B. Lubrication layer E. Liquid's resistance to flow
C. Elastomer core F. None of the Above

232. Which of the following terms offer long life and reliable service transporting thick or lumpy fluids, abrasive fluids will significantly shorten the life of the stator?
A. Elastomer D. Elastomer compatibility
B. Rotor E. Progressive cavity pumps
C. Axial F. None of the Above

233. Slurries can be pumped reliably, as long as the _____ enough to maintain a lubrication layer around the particles and so provide protection to the stator.
A. Torque D. Medium is viscous
B. Lubrication layer E. Liquid's resistance to flow
C. Elastomer core F. None of the Above

234. According to the text, specific designs involve the rotor of the pump being made of a steel, coated in a smooth hard surface, normally chromium, with the body made of a molded elastomer inside a?
A. Elastomer D. Elastomer/pumped fluid compatibility
B. Rotor E. Progressive cavity pumps
C. Metal tube body F. None of the Above

235. Which of the following terms of the stator forms the required complex cavities?
A. Torque D. Force
B. Lubrication layer E. Liquid's resistance
C. Elastomer core F. None of the Above

236. Which of the following terms is used for the stator to simplify the creation of the complex internal shape?
A. Elastomer D. Elastomer/pumped fluid compatibility
B. Rotor E. Progressive cavity pumps
C. Helicase F. None of the Above

237. Two common designs of stator are the "Equal-walled" and the?
A. Unequal walled D. Distort under pressure
B. Lubrication layer E. Liquid's resistance to flow
C. Elastomer core F. None of the Above

Submersible Pump Section
238. Submersible pumps are in essence very similar to?
A. Cased wells D. Pump bowl assembly
B. Turbine pumps E. VHS or VSS motors
C. Pump’s intake F. None of the Above

239. The pump shaft has a keyway in which the splined motor end shaft inserts, the motor is often bolted to the?
A. Motor D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

240. The pump's intake is located between the motor and the pump and is normally screened to prevent sediment from entering the pump and damaging the?
A. Impellers D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

241. These types of pumps are installed such that flow through the _____can occur upwards past the motor and into the intake.
A. Well screen D. Pump housing
B. Pump shrouds E. Number of stages
C. Volute F. None of the Above

242. Which of the following terms if inserted below the screened interval or below all productive portions of the aquifer, it will not be cooled, resulting in premature motor failure?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Motor end
C. Pump's intake F. None of the Above

243. Some pumps may have _____ installed on them to force all the water to move past the motor to prevent overheating.
A. Motor D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

244. Which of the following terms is a piece of pipe that attaches to the pump housing with an open end below the motor?
A. Cased wells D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

245. With the turbine pump, the size of the bowls and impellers, number of stages, and horsepower of the motor are adjusted to achieve the desired production rate within the limitations of the?
A. Motor D. Pump housing
B. Pump shrouds E. Pumping head
C. Canned configurations F. None of the Above

Understanding the Operation of a Vertical Turbine Pump
246. Turbine pump efficiencies are comparable to or greater than most centrifugal pumps, these are usually more expensive than centrifugal pumps and more difficult to inspect and repair.
A. True B. False

247. According to the text, the intake for the turbine pump is continuously under water, priming is not a concern.
A. True B. False

248. Which of the following terms are available in deep well, shallow well, or canned configurations?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Vertical turbine pumps
C. Pump's intake F. None of the Above

249. Which of the following terms are also available, these pumps are also suitable industrial, municipal, commercial and agricultural applications?
A. Motor D. Submersible motors
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

250. Deep well turbine pumps are adapted for use in cased wells or where the water surface is below the practical limits of a?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Centrifugal pump
C. Pump's intake F. None of the Above

251. Which of the following terms are also used in surface water systems?
A. Turbine pumps D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

252. According to the text, the turbine pump has three main parts: (1) the_____, (2) the shaft and column assembly and (3) the pump bowl assembly.
A. Head assembly D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

253. The head is normally cast iron and designed to be installed on a foundation. It supports the column, shaft, and bowl assemblies, and provides a discharge for the water.
A. True B. False

254. The head will support either an electric motor, a _____or a belt drive.
A. Right angle gear drive D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

Bowl Assembly
255. The clutch assembly is the heart of the vertical turbine pump.
A. True B. False

256. The impeller and diffuser type casing is designed to deliver the energy that the system requires as efficiently as possible.
A. True B. False

257. Maximum flexibility both in the initial pump selection and in the event that future system modifications require a change in the pump rating, therefore Vertical turbine pumps can be?
A. Clutch driven D. Progressive
B. Driver mounted E. Multi-staged
C. Solid shaft drivers F. None of the Above

258. The submerged impellers allow the pump to be started with a foot valve.
A. True B. False

259. Which of the following terms changes the direction of flow from vertical to horizontal, and couples the pump to the system piping, in addition to supporting and aligning the driver?
A. Clutch assembly D. Discharge head
B. Driver mounting base E. Priming Capacity
C. Solid shaft drivers F. None of the Above

260. Which of the following terms is where the pump shaft extends through a tube in the center of the rotor and is connected to the driver by a clutch assembly at the top of the driver?
A. Clutch assembly D. Aligning the driver
B. Driver mounting base E. Hollow shaft drivers
C. Solid shaft drivers F. None of the Above

261. With the solid shaft driver, the _____is solid and projects below the driver mounting base.
A. Clutch assembly D. Aligning the driver
B. Rotor shaft E. Priming Capacity
C. Solid shaft drivers F. None of the Above

Discharge Head Assembly
262. The discharge head supports the driver and bowl assembly as well as supplying a discharge connection also called?
A. NUF D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

263. According to the text, a shaft sealing arrangement is located in the discharge head to seal the shaft where it leaves the?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Liquid chamber F. None of the Above

264. The shaft seal is usually a lantern ring type device.
A. True B. False

Column Assembly
265. Due to its limited diameter, each impeller develops a relatively low head.
A. True B. False

266. In most deep well turbine installations, several bowls are stacked in series one above the other, this is called staging.
A. True B. False

267. The oil-lubricated pump has an enclosed shaft into which oil drips, lubricating the bearings.
A. True B. False

268. The shaft and _____provides a connection between the head and pump bowls.
A. Column assembly D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

269. The line shaft transfers the power from the motor to the impellers and the column carries the water to the surface.
A. True B. False

270. Which of the following terms on a turbine pump may be either water lubricated or oil lubricated?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Oil drips F. None of the Above

271. According to the text, the water-lubricated pump has?
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. Bowls are stacked in series
C. Discharge head F. None of the Above

272. According to the text, if there is a possibility of fine sand being pumped, select the oil lubricated pump because it will keep the _____of the bearings.
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Sand out F. None of the Above

273. Line shaft bearings are commonly placed on _____ for water-lubricated pumps operating at speeds under 2,200 RPM and at 5-foot centers for pumps operating at higher speeds.
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

274. According to the text, oil-lubricated bearings are commonly placed on?
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. 5-foot centers
C. Discharge head F. None of the Above

275. Which of the following terms encloses the impeller?
A. Pump bowl D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

276. Which of the following terms contains four impellers; all attached to a common shaft and will operate at four times the discharge head of a single-stage pump?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Four-stage bowl assembly
C. Fine sand F. None of the Above

277. Which of the following terms used in turbine pumps may be either semi-open or enclosed?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Impellers F. None of the Above

278. The vanes on semi-open impellers are open on the bottom and they rotate with a close tolerance to the bottom of the?
A. Pump bowl D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

279. During the initial break-in period the line shaft couplings will tighten, therefore, after about 1000 hours of operation, the impeller adjustments should be checked.
A. True B. False

280. According to the text, the column assembly is of two basic types, either of which may be used: Open _____construction utilizes the fluid being pumped to lubricate the lineshaft bearings.
A. Pumping level D. Upward adjustment
B. Lineshaft E. Utilizes the fluid
C. Discharge head F. None of the Above

281. Which of the following terms has an enclosing tube around the lineshaft and utilizes oil, grease, or injected liquid to lubricate the lineshaft bearings?
A. Bowl shaft D. Lineshaft
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

Column assembly will consist of:
282. According to the text, column pipe, which connects the _____to the discharge head,
A. Pumping level D. Upward adjustment
B. Bowl assembly E. Utilizes the fluid
C. Discharge head F. None of the Above

283. Shaft, connecting the bowl shaft to the?
A. Bowl shaft D. Lineshaft bearings
B. Driver E. Discharge head
C. Suction bell F. None of the Above

284. Column pipe may be either threaded or flanged.
A. True B. False

285. Some units will not require_____, having the bowl assembly connected directly to the discharge head instead.
A. Bowl shaft D. Column assembly
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

Bowl Assemblies
The bowl consists of:

286. Impellers rigidly mounted on the _____, which rotate and impart energy to the fluid,
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

287. Which of the following terms to contain the increased pressure and direct the fluid?
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

288. Which of the following terms or case that directs the fluid into the first impeller?
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

289. Bearings located in the suction bell (or case) and in each?
A. Bowl shaft D. Lineshaft bearings
B. Bowl E. Discharge head
C. Suction bell F. None of the Above

290. Which of the following terms may cause inefficient pump operation if they are not properly adjusted?
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Impellers
C. Column pipe F. None of the Above

291. Mechanical damage will result if the semi-open impellers are set too low and the vanes rub against the bottom of the?
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

292. These must still be checked and adjusted, the adjustment of _____ is not as critical.
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

293. Impeller adjustments are made by tightening or loosening a nut on the top of the?
A. Line shaft D. Head assembly
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

294. Which of the following terms are normally made by lowering the impellers to the bottom of the bowls and adjusting them upward?
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Impeller adjustments
C. Suction bell F. None of the Above

295. The amount of _____is determined by how much the line shaft will stretch during pumping.
A. Pumping level D. Upward adjustment
B. Tolerance E. Leakage
C. Discharge head F. None of the Above

296. According to the text, the adjustment must be made based on the lowest possible pumping level in the well, the proper adjustment procedure if often provided by the?
A. Pumping level D. Upward adjustment
B. Tolerance E. Pump manufacturer
C. Discharge head F. None of the Above

Stuffing Box Adjustment
297. On the initial starting it is very important that the packing gland not be tightened too much.
A. True B. False

298. To prevent damage to the shaft and shortening of the packing life, new packing must be "_____" properly
A. Packing gland D. Lineshaft bearings
B. Run in E. Variances
C. Impending trouble F. None of the Above

299. The stuffing box must be allowed to leak for?
A. Periodic inspection D. Any deviation in performance
B. Proper operation E. Air to be released
C. Correct alignment F. None of the Above

300. Bring both nuts down evenly and in small steps until the leakage is reduced as required, when adjusting the?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Lantern
C. Impending trouble F. None of the Above

301. The nuts should only be tightened about ½ turn at a time at 20 to 30 minute intervals to allow the packing to?
A. Run in D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

302. A new set of ring packing will need to be added to keep the?
A. Packing gland D. Lineshaft bearings
B. Box full E. Variances
C. Impending trouble F. None of the Above

303. According to the text, after adding two or three rings of packing, or when proper adjustment cannot be achieved, the _____should be cleaned completely of all old packing and re-packed.
A. Periodic inspection D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

Lineshaft Lubrication

304. Which of the following terms are lubricated by the pumped fluid and on close-coupled units, will usually not require pre or post lubrication?

A. Packing gland
B. Oil reservoir
C. Driver
D. Open lineshaft bearings
E. Enclosed lineshaft bearings
F. None of the Above

305. Which of the following terms are lubricated by extraneous liquid, which is fed to the tension nut by either a gravity flow system or pressure injection system?

A. Packing gland
B. Oil reservoir
C. Impending trouble
D. Open lineshaft bearings
E. Enclosed lineshaft bearings
F. None of the Above

306. According to the text, the oil reservoir must be kept filled with a good quality _____and adjusted to feed 10 to 12 drops per minute plus one (1) drop per 100' of setting.

A. Packing gland
B. Oil reservoir
C. Impending trouble
D. Lineshaft bearings
E. Light turbine oil
F. None of the Above

307. Injection systems are designed for each installation — injection pressure and quantity of lubricating liquid will vary.

A. True B. False

Section 8- Pump Operation and Performance Key Terms

308. Which of the following definitions is the engineering science pertaining to liquid pressure and flow?

A. Pressure, Absolute
B. Pressure
C. Hydraulics
D. Hydrokinetics
E. Pascal's Law
F. None of the Above

309. Which of the following definitions is the engineering science pertaining to the energy of liquid flow and pressure?

A. Pressure, Absolute
B. Pressure
C. Hydraulics
D. Hydrokinetics
E. Pascal's Law
F. None of the Above

310. Which of the following definitions is the pressure applied to a confined fluid at rest is transmitted with equal intensity throughout the fluid?

A. Pressure, Absolute
B. Pressure
C. Hydraulics
D. Hydrokinetics
E. Pascal's Law
F. None of the Above

311. Which of the following definitions is the application of continuous force by one body upon another that it is touching; compression?

A. Pressure, Absolute
B. Pressure
C. Hydraulics
D. Hydrokinetics
E. Pascal's Law
F. None of the Above

312. Which of the following definitions is used to indicate gauge pressure?
A. Head, Friction D. Hydraulics
B. Head, static E. Hydrokinetics
C. Head F. None of the Above

313. Which of the following definitions is when the pressure is equal to the height times the density of the liquid?
A. Head, Friction D. Hydraulics
B. Head, static E. Hydrokinetics
C. Head F. None of the Above

314. Which of the following definitions is required to overcome the friction at the interior surface of a conductor and between fluid particles in motion?
A. Head, Friction D. Hydraulics
B. Head, static E. Hydrokinetics
C. Head F. None of the Above

315. Which of the following definitions varies with flow, size, type, and conditions of conductors and fittings, and the fluid characteristics?
A. Head, Friction D. Hydraulics
B. Head, static E. Hydrokinetics
C. Head F. None of the Above

316. Which of the following definitions is the pressure in a fluid at rest?
A. Pressure, Atmospheric D. Pressure, Gauge
B. Pressure, Static E. Pascal's Law
C. Hydraulics F. None of the Above

317. Which of the following definitions is the height of a column or body of fluid above a given point?
A. Head, Friction D. Hydraulics
B. Head, static E. Hydrokinetics
C. Head F. None of the Above

318. Which of the following definitions is the pressure exerted by the atmosphere at any specific location?
A. Pressure, Atmospheric D. Pressure, Gauge
B. Pressure, Static E. Pascal's Law
C. Hydraulics F. None of the Above

319. Which of the following definitions is pressure above zone absolute, i.e. the sum of atmospheric and gauge pressure?
A. Pressure, Absolute D. Hydrokinetics
B. Pressure E. Pascal's Law
C. Hydraulics F. None of the Above

320. Sea level pressure is approximately 2.31 pounds per square inch absolute, 1 bar = .433 psi.
A. True B. False

NPSH - Net Positive Suction Head

321. NPSH (a) must exceed NPSH(r) to allow pump operation without cavitation.
A. True B. False

322. The vapor pressure of water at 95 degrees C is 84.53 kPa, there was enough suction to contain the vapor, but once the atmospheric pressure dropped at the higher elevation, the vapor was able to escape.
A. True B. False

323. NPSH(r) is the Net Positive Suction Head Required by the pump, which is read from the?
A. Pump suction D. Pump performance curve
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Affinity Laws

324. The Centrifugal Pump is a very capable and?
A. Centrifugal Pump D. Atmospheric pressure
B. Transmit tension E. Flexible machine
C. Most economical F. None of the Above

325. The performance of a centrifugal pump can be varied by changing the _____ or its rotational speed.
A. Pump suction D. Rotational speed
B. Speed E. Impeller diameter
C. Suction conditions F. None of the Above

326. Reducing impeller diameter is probably the most common change and is usually the?
A. Most economical D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

327. The speed can be altered by changing _____or by changing the speed of the driver.
A. Pump suction D. Rotational speed
B. Pulley diameters E. Hydraulic efficiency
C. Suction conditions F. None of the Above

328. Which of the following terms or change in impeller diameter, the Laws of Affinity give results that are approximate?
A. Centrifugal Pump D. Speed change
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

329. According to the text, the discrepancy between the _____and the actual values obtained in test are due to hydraulic efficiency changes that result from the modification.
A. Calculated values D. Rotational speed
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

330. Which of the following terms give reasonably close results when the changes are not more than 50% of the original speed or 15% of the original diameter?
A. Centrifugal Pump D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

331. Which of the following terms are some of the most important factors affecting centrifugal pump operation?
A. Pump suction D. Rotational speed
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Suction Lift
332. According to the text, atmospheric pressure at sea level is called absolute pressure because it is a measurement using absolute zero as a base.
A. True B. False

333. A pump cannot push or "force" a liquid up its suction pipe because liquids do not exhibit tensile strength.
A. True B. False

334. The vapor pressure of a liquid is the pressure necessary to keep the liquid from vaporizing at a given temperature.
A. True B. False

335. When a pump creates a suction, it is simply reducing local pressure by creating a partial vacuum.
A. True B. False

336. Atmospheric or some other external pressure acting on the surface of the liquid pushes the liquid up the suction pipe into the pump.
A. True B. False

337. According to the text, no pump can attain a suction lift of 34 ft; however, well-designed ones can reach 25 ft quite easily.
A. True B. False

338. In addition to pump design and_____, there are two physical properties of the liquid being pumped that affect suction lift.
A. Pump suction D. Suction piping
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

339. Maximum suction lift is dependent upon the pressure applied to the surface of the liquid at the suction source. _____decreases as pressure decreases.
A. Centrifugal Pump D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Maximum suction lift F. None of the Above

340. Which of the following terms is dependent upon the vapor pressure of the liquid being pumped?
A. Pump suction D. Maximum suction lift
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

341. Vapor pressure increases as liquid temperature increases. _____decreases as vapor pressure rises.
A. Vapor pressure D. Rotational speed
B. Speed E. Maximum suction lift
C. Suction conditions F. None of the Above

342. Maximum suction lift will increase as the external pressure on its source increases.
A. True B. False

Cavitation - Two Main Causes:
343. Due to low pressure the _____and higher pressure implodes into the vapor bubbles as they pass through the pump, causing reduced performance and potentially major damage.
A. Pump suction D. Water vaporizes (boils)
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

344. Suction or discharge recirculation. The pump is designed for a certain flow range, if there is not enough or too much flow going through the pump, the resulting _____can reduce performance and damage the pump.
A. Pump suction D. Turbulence and vortexes
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Affinity laws
345. The flow changes proportionally to speed.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

346. The pressure changes by the square of the difference.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

347. The power changes by the cube of the difference.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

348. Which of the following terms is the height we are pumping to, or the height to the discharge piping outlet that is filling the tank from the top?
A. Static head D. System or dynamic head
B. Pump discharge head E. Negative suction head
C. Friction Loss F. None of the Above

349. Which of the following terms, pumping to a pressurized vessel we must convert the pressure units to head units?
A. Positive suction head D. Negative suction head
B. Pressure head E. Total Dynamic Head (TDH)
C. Friction Loss F. None of the Above

350. Which of the following terms is caused by friction in the pipes, fittings, and system components?
A. Static head D. System or dynamic head
B. Pump discharge head E. Negative suction head
C. Friction Loss F. None of the Above

Suction Head is Measured the Same Way.
351. If the liquid level is above the pump centerline, that level is a positive suction head.
A. True B. False

352. If the pump is lifting a liquid level from below its centerline, it is a?
A. Positive suction head D. Negative suction head
B. Friction E. Total Dynamic Head (TDH)
C. Friction Loss F. None of the Above

353. If the pump is pumping liquid from a pressurized vessel, you must convert this pressure to a positive suction head.
A. True B. False

354. A vacuum in the tank would be converted to a?
A. Static head D. System or dynamic head
B. Pump discharge head E. Negative suction head
C. Friction Loss F. None of the Above

355. Friction loss is calculated via a formula or a chart, taking into account the pipe diameter and roughness and the fluid flow rate, density, and viscosity.
A. True B. False

356. According to the text, friction in the pipes, fittings, and associated hardware is a?
A. Positive suction head D. Negative suction head
B. Friction E. Total Dynamic Head (TDH)
C. Friction Loss F. None of the Above

Section 10- Groundwater Production System
Water Well Reports and Hydrogeology- Hydrogeologic Data
357. For hydrogeologists to make reliable assessments about the current and future status of ground water, they need to know where ground water occurs in the subsurface, what the properties are of the various geologic units below the surface, and how fast and in what direction ground water is moving.
A. True B. False

Nature of the Aquifer
358. An unconfined aquifer has which missing term as its upper surface; there are no significant low-permeability layers between the water table and the surface?
A. Hydraulic head
B. Water table
C. A confined aquifer
D. Hydraulic conductivity
E. Permeability, or hydraulic conductivity
F. None of the Above

359. According to the text, the top of the aquifer, can rise or fall depending on water use and amount of recharge to the aquifer and is called?
A. Aquifer (porosity)
B. Hydraulic head
C. Geologic materials
D. Water table
E. Ground water
F. None of the Above

360. Which of the following terms has a low-permeability geologic formation as its upper boundary?
A. Hydraulic head
B. An aquifer
C. A confined aquifer
D. Hydraulic conductivity
E. Permeability, or hydraulic conductivity
F. None of the Above

Hydraulic Head (h)
361. According to the text, the hydraulic head is a measure of the water at a certain depth possesses because of its elevation and the pressure exerted through the weight of the water above it.
A. True B. False

362. Which of the following terms has units of feet, and generally corresponds to the elevation of water in the well?
A. Aquifer (porosity)
B. Hydraulic head
C. Geologic materials
D. Amount of recharge to the aquifer
E. Ground water
F. None of the Above

Aquifer Porosity (n)
363. The volume of open space relative to the _____and the degree to which these pore spaces are interconnected controls the volume of water in the aquifer and the amount of water that can be reasonably withdrawn from the aquifer.
A. Total volume of the aquifer (porosity)
B. Hydraulic head
C. Geologic materials
D. Amount of recharge to the aquifer
E. Ground water
F. None of the Above

Permeability of the Aquifer (K)
364. Which of the following terms or the permeability of the aquifer is a measure of how fast ground water can move through the aquifer?
A. Hydraulic head
B. An aquifer
C. A confined aquifer
D. Conductivity
E. Hydraulic conductivity
F. None of the Above

365. Which of the following terms has units of distance/time, e.g., feet/day, although it does not represent an actual speed?
A. Hydraulic head D. Hydraulic conductivity
B. An aquifer E. Permeability
C. A confined aquifer F. None of the Above

In What Direction Is Groundwater Flowing?
366. The direction of ground water flow is from higher to lower?
A. Aquifer (porosity) D. Amount of recharge to the aquifer
B. Hydraulic head E. Ground water
C. Geologic materials F. None of the Above

367. Which of the following terms can be measured by lowering a probe through the observation port of a number of wells, all within the same relative time period?
A. Hydraulic head D. Hydraulic conductivity
B. An aquifer E. Permeability, or hydraulic conductivity
C. A confined aquifer F. None of the Above

What Is the Drawdown Associated with Pumping of a Well?
368. There is a relation between the pumping rate of the well, the transmissivity of the aquifer, the distance between wells, this missing term, and the duration of the pumping event.
A. Aquifer (porosity) D. Amount of recharge to the aquifer
B. Hydraulic head E. Storage coefficient of the aquifer
C. Geologic materials F. None of the Above

Depth to First Water-Bearing Zone
369. Some report the depth at which water is first encountered in?
A. The drill hole D. Recharge and discharge zone(s)
B. SWL E. Hydrogeologic investigation(s)
C. The yield F. None of the Above

Static Water Level
370. The driving force for ground water movement is the hydraulic head, and the _____ is a measure of that force.
A. Static water level (SWL) D. Perforated portions of cased wells
B. Data on the well report E. Weak (fractured) zones
C. Local ground water systems F. None of the Above

371. Identifying where one aquifer ends and another begins is key to identifying the source of the yield for individual wells. Although this often can be determined by careful review of the lithologic log provided by the well constructor, the transition from one aquifer to the next can be indicated by a marked change in the recharge and discharge zones
A. True B. False

372. Which of the following terms is a better indicator that a different aquifer has been encountered than the lithologic description?
A. Drill hole D. Recharge and discharge zone(s)
B. SWL E. Hydrogeologic investigation(s)
C. The yield F. None of the Above

373. Which of the following terms have important implications in ground water protection and identifying the relation between area ground water and local streams?
A. Weak (fractured) zones
B. SWL
C. The yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

Water-Bearing Zones
374. In some cases, the screened or perforated portions of cased wells provide a clue, but all too often, the screened interval is either significantly less than the actual static water level.
A. True B. False

375. Arriving at accurate estimates of aquifer parameters or calculating ground water velocity requires us to know the thickness of the?
A. Water-bearing zone(s)
B. SWL
C. Yield
D. Recharge and discharge zone(s)
E. Hydrogeologic investigation(s)
F. None of the Above

Lithologic Log
376. The well log portion of the well report describes what the driller encountered in the subsurface.
A. True B. False

Contributions of Well Constructors to Hydrogeology
377. This document stresses the importance of data that is recorded on well reports and how that data influences hydrogeologic investigations.
A. True B. False

378. Well constructors can provide important contributions to the science by making careful observations and measurements when recording that data on the?
A. Static water level
B. Well report
C. Local ground water systems
D. Perforated portions of cased wells
E. Weak (fractured) zones
F. None of the Above

How Wells Are Drilled
379. A few examples of today's more common well drilling methods include rotary, auger, and cable tool with?
A. Many variations of each
B. Typical drilling fluid(s)
C. Advanced methods
D. A highly trained and skilled driller
E. Today's more common well drilling methods
F. None of the Above

380. Drilling fluids are often used during drilling in order to keep the borehole open while drilling is done.
A. True B. False

381. Typical drilling fluids may be water, mud, air, chemical or natural additives, or combinations of each.
A. True B. False

Basic Rotary Drilling Methods

382. Rotary drilling utilizes two methods that include: direct and reverse mud rotary, direct air rotary, and?

A. Rotary drilling
B. Typical drilling fluid(s)
C. Advanced methods
D. Drill through casing driver methods
E. Today's more common well drilling methods
F. None of the Above

The Rotary Drill String

383. Rotary drilling methods use a drill string, which typically consists of a bit, collar, drill pipe and?

A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. A kelly
F. None of the Above

384. Which of the following terms is a section of heavy walled pipe that can be hexagonal, square, or rounded with grooves?

A. The flighting
B. The plug
C. The bucket
D. A kelly
E. The cutting head
F. None of the Above

385. Which of the following terms is several feet longer than the drill pipe being used and fits into the table drive much like the splines on a drive shaft fit into a transmission?

A. Drilling method
B. The Kelly
C. The table drive
D. A sub
E. Rotary bit
F. None of the Above

386. Some rotary rigs use a top drive to turn _____ and are like a drill press.

A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. The drill string
F. None of the Above

387. Drill pipe can be used in various lengths but are typically 20-foot sections and may be connected to the drive unit with?

A. Drilling method
B. The Kelly
C. The table drive
D. A sub
E. Rotary bit
F. None of the Above

388. A sub is a length of pipe used to connect pipes and/or act as shock absorber (between the drill pipes and drive unit, at the end of the drill pipe is?

A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber
E. The kelly
F. None of the Above

389. Which of the following terms or stabilizer is typically very heavy and is often gauged close to the diameter of the bit being used?

A. Drilling method
B. The Kelly
C. The table drive
D. The drill collar
E. Rotary bit
F. None of the Above

390. Which of the following terms aids in maintaining a consistent borehole diameter and primarily helps to prevent borehole deviation?
A. The drill collar
B. Drag bit(s)
C. Roller bit(s)
D. Shock absorber (floating sub)
E. The kelly
F. None of the Above

Air Rotary Method
391. Air rotary methods utilize compressed air and derived drill cuttings and groundwater as the drilling fluid.
A. True
B. False

392. Which of the following terms is kept in a pressured condition while drilling, in order to maintain the circulation of drilling fluid to the surface?
A. The flighting
B. The plug
C. The bucket
D. The borehole
E. The cutting head
F. None of the Above

393. Which of the following terms is often added while drilling with air in order to maintain sufficient hole pressurization so that cuttings may be lifted to the surface efficiently while maintaining hole stability?
A. The air rotary method
B. Soil or formation sample(s)
C. Air
D. Biodegradable foam or surfactant (soap)
E. Mud
F. None of the Above

394. According to the text, the air rotary method is particularly suitable to soft dirt drilling with a down hole air hammer.
A. True
B. False

395. The air hammer utilizes compressed air to drive a piston up and down which makes which term move up and down while the drill string rotates?
A. The air rotary method
B. Soil or formation sample(s)
C. Air
D. The hammer bit
E. The total target depth
F. None of the Above

396. Which of the following terms action generates great rock breaking force and is very valuable for drilling through solid rock or consolidated formations?
A. Roller bit(s)
B. Drilling
C. The borehole
D. The mud rotary method
E. The combined rotating and hammering
F. None of the Above

397. Which of the following terms in hard rock or consolidated formations, may be used when drilling pressures are too high or borehole sizes are too large for the efficient operation of an air hammer?
A. The flighting
B. A roller button bit
C. The bucket
D. A telescoping kelly
E. The cutting head
F. None of the Above

Drill through Casing Driver Method
398. The drill through casing driver method drives casing into the borehole as the telescoping kelly advances.
A. True
B. False

399. Which of the following terms is a specially designed hardened steel ring that is installed on the casing end?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The cutting shoe
F. None of the Above

400. Which of the following terms is inserted into the casing and the casing is attached to the casing driver?

A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

401. Which of the following terms penetrates into the overburden or formation, the casing driver hammers the casing down, following the drill string?

A. The drill string
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

402. Which of the following terms may employ a hammer or roller bit?

A. The flighting
B. The plug
C. The bucket
D. The drill string
E. The cutting head
F. None of the Above

403. According to the text, cuttings rise to the surface with _____ through the casing and exit through the casing driver.

A. The injected air
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

404. According to the text, as the borehole is drilled, the cuttings are then collected near?

A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

405. Which of the following terms can continue until competent formation is encountered?

A. A hammer or roller bit
B. The drill string
C. A casing driver
D. The rig
E. The addition of casing and drill string
F. None of the Above

406. Which of the following terms is often used to install temporary casing in order to permit the installation of a well in unstable aquifers?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

407. Which of the following terms may be used as a puller to remove the temporary casing following well construction?

A. The flighting
B. The plug
C. The bucket
D. The casing driver
E. The cutting head
F. None of the Above

Auger Boring Methods

408. Auger boring methods make use of _____, which may be attached to a pilot bit and cutter head.

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. A rotating blade or spiral flange
E. The bucket auger method
F. None of the Above

409. Which of the following terms along with the rotating action of the blade and cutting action of the pilot and/or cutter bits facilitates the boring process?

A. The flighting
B. The plug
C. The bucket
D. A telescoping kelly
E. Down-force applied by the rig
F. None of the Above

410. Soil samples may be collected as cuttings rise or are brought to the surface, or they may be collected with?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

411. Which of the following terms are capable of boring large diameter holes in excess of four feet in diameter?

A. Auger boring method(s)
B. Augers
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

412. According to the text, there are three primary types of which term: solid stem, bucket, and hollow stem?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

Solid Stem Auger Method

413. Which of the following terms method uses a spiral flanged drill pipe driven by either a kelly or rotary drive head, like those used on rotary rigs?

A. Auger boring method(s)
B. Split spoon type sampler(s)
C. The solid stem auger boring method
D. The casing driver method
E. The bucket auger method
F. None of the Above

What is a Significant Deficiency?

414. Significant deficiencies cause, or have the potential to cause, the introduction of contamination into water delivered to customers include defects in design, operation, or maintenance of?

A. Well screen
B. The aquifer
C. A pumping test
D. The amount of water production
E. The source, treatment or distribution systems
F. None of the Above

Selecting an Appropriate Well Site

415. Before a well can be drilled a permit is normally required. The permit helps to ensure that an appropriate location of the well is selected which reduces the possibility of contamination.

A. True B. False

416. The ideal well location has good drainage and is higher than_____ .
A. The quality of drinking water D. The surrounding ground surface
B. The possibility of contamination E. Preliminary aquifer parameters
C. Surface drainage(s) F. None of the Above

417. Which of the following terms should be at a lower elevation than the well, and the distances to those contamination sources must be in accordance with the State or Local Water Well Construction Codes?
A. The quality of drinking water D. All possible sources of contamination
B. The possibility of contamination E. Preliminary aquifer parameters
C. Surface drainage(s) F. None of the Above

Common Well Construction Specifications
418. Which of the following terms should always be located and constructed in such a manner that they yield safe water at all times and under all conditions?
A. Water wells D. The amount of water production
B. The aquifer E. The optimum pumping rate
C. A pumping test F. None of the Above

Choice of Casing
419. According to the text, stainless steel casing and screen may be required for one situation, while PVC or low carbon steel may be acceptable in another.
A. True B. False

420. Which of the following terms needed is related to the type of aquifer, well depth, water quality, well use, and regulatory requirements?
A. The type of well casing D. The casing and screen specifications
B. The inflatable packer E. Well screen(s)
C. The louver(s) F. None of the Above

421. According to the text, as with casing, the choice of well screen is as important as its placement, the size of the openings in the casing are dependent on the grain size of the filter or?
A. The anticipated flow rate D. Unstable or non-productive areas
B. The well E. The upper borehole from the surface
C. Gravel pack F. None of the Above

Selecting an Optimum Pumping Rate
422. Specific capacities for each of the pumping steps are compared. The highest Sc observed is normally associated with?
A. The anticipated flow rate D. Unstable or non-productive areas
B. The well E. The upper borehole from the surface
C. The optimum pumping rate F. None of the Above

Pump Selection Section
Three Basic Types of Wells
423. Which of the following terms are usually bored into an unconfined water source, generally found at depths of 100 feet or less?
A. Unconsolidated or sand well(s) D. Total dynamic or discharge head
B. Bored or shallow well(s) E. The most important components
C. The proper selection F. None of the Above

424. Which of the following terms are drilled into a formation consisting entirely of a natural rock formation that contains no soil and does not collapse?
A. Consolidated or rock wells
B. Screen filter(s)
C. Power requirement(s)
D. Total equivalent feet of lift
E. The total friction head
F. None of the Above

425. Which of the following terms are drilled into a formation consisting of soil, sand, gravel, or clay material that collapses upon itself?
A. Unconsolidated or sand well(s)
B. Bored or shallow well(s)
C. The proper selection
D. Total dynamic or discharge head
E. The most important components
F. None of the Above

Selection of Pumping Equipment

426. The proper selection of pumping equipment for a well is of great importance.
A. True B. False

427. The primary factors that must be considered before selecting the well pump are: flow rate, line pressure, pumping lift, and _____ and size of piping.
A. Power requirements (and limitations)
B. Screen filter(s)
C. Power requirement(s)
D. Total equivalent feet of lift
E. The total friction head
F. None of the Above

Pumping Lift and Total Dynamic or Discharge Head

428. The most important components in selecting the correct pump for your application are: total pumping lift and?
A. Cavitation
B. Suction head
C. Velocity head
D. Total dynamic or discharge head
E. Pressure head
F. None of the Above

429. Which of the following terms refers to the total equivalent feet of lift that the pump must overcome in order to deliver water to its destination, including frictional losses in the delivery system?
A. Total dynamic head
B. Screen filter(s)
C. Power requirement(s)
D. Total equivalent feet of lift
E. The total friction head
F. None of the Above

Section 11- Electrical Motors

430. The purpose of the bearing house is to hold the shaft firmly in place, yet allow it to rotate.
A. True B. False

431. The pump assembly can only be a vertical set-up.
A. True B. False

432. The power source of the pump is usually an electric motor. The motor is connected by a coupling to the?
A. Static head
B. Bearings
C. Pump assembly
D. System or dynamic head
E. Pump shaft
F. None of the Above

433. Which of the following terms supports the bearings and provides a reservoir for the lubricant?
A. Static head D. System or dynamic head
B. Bearings E. Bearing house
C. Pump assembly F. None of the Above

434. An impeller is connected to the?
A. Static head D. System or dynamic head
B. Bearings E. Shaft
C. Pump assembly F. None of the Above

D-C Motors
435. The important characteristic of the D-C motor is that its speed will not vary with the amount of current used.
A. True B. False

436. There are many different kinds of D-C motors, depending on how they are wound and their totally enclosed motors.
A. True B. False

A-C Motors
437. The synchronous type of A-C motor is used in smaller horsepower sizes, usually above 100 HP.
A. True B. False

438. There are a number of different types of alternating current motors, such as Synchronous, Induction, wound rotor, and?
A. Bubbler pipe D. Totally enclosed motors
B. Manual pump controls E. Squirrel cage
C. Wound rotor type F. None of the Above

439. Which of the following terms of A-C motor requires complex control equipment, since they use a combination of A-C and D-C.
A. Heat generated D. Speed/torque characteristics
B. Synchronous type E. Full voltage or reduced voltage
C. Motor(s) F. None of the Above

440. The induction type motor uses only alternating current.
A. True B. False

441. The squirrel cage motor provides a relatively constant speed.
A. True B. False

442. The wound rotor type could be used as a?
A. Bubbler pipe D. Totally enclosed motor
B. Manual pump controls E. Reduced voltage starter
C. Variable speed motor F. None of the Above

Motor Starters
443. All electric motors, except very large ones are equipped with starters, either full voltage or reduced voltage.
A. True B. False

444. Motors draw a much higher current when they are?
A. Heat generated D. Starting and gaining speed
B. Synchronous type E. Full voltage or reduced voltage
C. Motor(s) F. None of the Above

445. The purpose of the _____is to prevent the load from coming on until the amperage is low enough.
A. Bubbler pipe D. Totally enclosed motors
B. Manual pump controls E. Reduced voltage starter
C. Reduced voltage starter F. None of the Above

Motor Enclosures
446. Depending on the application, motors may need special protection.
A. True B. False

447. Some motors are referred to as open motors.
A. True B. False

448. Open motors allow air to pass through to remove heat generated when current passes through the windings.
A. True B. False

449. Totally enclosed motors include dust-proof, waterproof and explosion-proof motors.
A. True B. False

450. Other motors use _____for special environments or safety protection.
A. Heat generated D. Speed/torque characteristics
B. Synchronous type E. Full voltage or reduced voltage
C. Motor(s) F. None of the Above

451. Which of the following terms must be provided on any motor where dangerous gases might accumulate?
A. Bubbler pipe D. Totally enclosed motors
B. Manual pump controls E. Reduced voltage starter
C. Explosion proof enclosure F. None of the Above

Motor Controls
452. Which of the following terms are provided with some method of control, typically a combination of manual and automatic?
A. Heat generated D. Speed/torque characteristics
B. Synchronous type E. Full voltage or reduced voltage
C. Pump motors F. None of the Above

453. Which of the following terms can be located at the central control panel at the pump or at the suction or discharge points of the liquid being pumped?
A. Bubbler pipe D. Totally enclosed motors
B. Manual pump controls E. Reduced voltage starter
C. Wound rotor type F. None of the Above

454. Two typical level sensors are the float sensor and the bubble regulator.
A. True B. False

455. The float sensor is pear-shaped and hangs in the wet well.
A. True B. False

456. As the height increases, the float tilts, and the mercury in the glass tube flows toward the end of the tube that has two wires attached to it. When the mercury covers the wires, it closes the circuit.
A. True B. False

457. A low pressure air supply is allowed to escape from a _____ in the wet well.
A. Bubbler pipe D. Totally enclosed motors
B. Manual pump controls E. Reduced voltage starter
C. Wound rotor type F. None of the Above

Motor Maintenance
458. Motors should be kept clean, free of moisture, and lubricated properly.
A. True B. False

459. Dirt, dust, and grime will plug the _____and can actually form an insulating layer over the metal surface of the motor.
A. Heat generated D. Speed/torque characteristics
B. Synchronous type E. Full voltage or reduced voltage
C. Ventilating spaces F. None of the Above

Understanding Voltage
460. Voltage, electrical potential difference, electric tension or electric pressure and measured in units of electric potential.
A. True B. False

461. Volts, or joules per coulomb is the electric potential difference between two points, or the difference in electric potential energy of a unit charge transported between two points.
A. True B. False

462. Which of the following terms is equal to the work done per unit charge against a static electric field to move the charge between two points?
A. Energy D. Voltage
B. Pressure E. Charge
C. Electric potential F. None of the Above

463. Which of the following terms may represent either a source of energy or lost, used, or stored energy?
A. Electric current D. A static (unchanging) electric field
B. Voltage E. Electric potential difference
C. Electromotive force F. None of the Above

464. A voltmeter can be used to measure the _____ between two points in a system?
A. Energy D. Voltage
B. Pressure E. Charge
C. Electric potential F. None of the Above

465. According to the text, voltage can be caused by this missing term or, by electric current through a magnetic field, by time-varying magnetic fields, or some combination of these three.
A. Electric current
B. Static electric fields
C. Electromotive force
D. A static (unchanging) electric field
E. Electric potential difference
F. None of the Above

466. Voltage is electric potential energy per unit charge, measured in amps per coulomb.
A. True B. False

467. Which of the following terms must be distinguished from electric potential energy by noting that the "potential" is a "per-unit-charge" quantity?
A. Energy
B. Pressure
C. Electric potential
D. Voltage
E. Charge
F. None of the Above

468. Electric potential is mathematically expressed as the line integral of the electric field and the time rate of change of voltage.
A. True B. False

469. Which of the following terms can flow from lower voltage to higher voltage, but only when a source of energy is present to "push" it?
A. Energy
B. Pressure
C. Current
D. Voltage
E. Charge
F. None of the Above

470. Which of the following terms is not the only factor determining charge flow?
A. Electric field
B. Voltage
C. Electromotive force
D. Resistance
E. Electric potential difference
F. None of the Above

471. The electric potential of a material is not even a well-defined quantity, since it varies on the subatomic scale.
A. True B. False

Understanding Three-Phase Power

472. The three-phase system was introduced and patented by George Westinghouse.
A. True B. False

473. Which of the following terms electric power is a common method of alternating-current electric power generation, transmission, and distribution?
A. Power frequency
B. Three phase(s)
C. Poly-phase distribution
D. Single-phase power distribution
E. Balanced load
F. None of the Above

474. Which of the following terms more economical than others because it uses less conductor material to transmit electric power than equivalent single-phase or two-phase systems at the same voltage?
A. Three-phase system
B. High power system
C. Single phase
D. Supply conductor
E. Balanced load
F. None of the Above

475. In a three-phase system, _____carry three alternating currents (which reach their instantaneous peak values at different times.
A. A balanced load
B. Single-phase
C. Three circuit conductors
D. Instantaneous peak values
E. This delay between phases
F. None of the Above

476. Taking one conductor as the reference, the other two currents are delayed in time by one-third and two-thirds of one cycle of the?
A. Neutral wire
B. Electric current
C. Four-phase system
D. Linear balanced load
E. Lowest phase order
F. None of the Above

477. Which of the following terms has the effect of giving constant power transfer over each cycle of the current and makes it possible to produce a rotating magnetic field in an electric motor?
A. This delay between phases
B. Three-phase circuits
C. Three-phase system
D. Linear balanced load
E. The lowest phase order
F. None of the Above

478. Three-phase systems may have a?
A. Neutral wire
B. Three-phase circuits
C. One phase system
D. Linear balanced load
E. The lowest phase order
F. None of the Above

479. A hot wire allows the three-phase system to use a higher voltage while still supporting lower-voltage single-phase appliances.
A. True B. False

Section 12 – SCADA Introduction

480. Industrial organizations and companies in the public and private sectors to maintain and control efficiency, distribute data for smarter decisions, and communicate system issues to help mitigate downtime utilize SCADA systems.
A. True B. False

481. SCADA systems are critical for industrial organizations (like water and wastewater facilities) since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.
A. True B. False

482. The SCADA software will process, distribute, and display important data, helping operators and other employees understand the data and make important decisions.
A. True B. False

483. The acronym SCADA refers to the centralized computer systems that control and monitor the entire sites, or they are the complex systems spread out over large areas. Nearly all the control actions are automatically performed by the remote terminal units (RTUs) or by the programmable logic controllers (PLCs).
A. True B. False

484. Data acquisition starts at the HMI level, which includes the equipment status reports, and meter readings. Data is then formatted in such way that the operator of the control room can make the supervisory decisions to override or adjust normal HMI controls, by using the PLC.
A. True B. False

485. SCADA systems implement the distributed databases known as Excel databases, containing data elements called rows or columns.
A. True B. False

486. The key attribute of a SCADA system is its capability to perform a supervisory operation over a variety of other proprietary devices.
A. True B. False

487. The internet is linked to the SCADA system's databases, to provide the diagnostic data, management information and trending information such as logistic information, detailed schematics for a certain machine or sensor, maintenance procedures and troubleshooting guides.
A. True B. False

488. The HMI, or Human Machine Interface, is a device apparatus that gives the processed data to the human operator. A human operator uses HMI to control processes.
A. True B. False

489. The information provided by the HMI to the operating personnel is graphical, in the form of mimic diagrams. This means the schematic representation of the plant that is being controlled is obtainable to the operator.
A. True B. False

490. Which of the following terms can convert electrical signals coming from the equipment into digital values like the status- open/closed – from a valve or switch, or the measurements like flow, pressure, current or voltage?
A. RTU C. PLC
B. HMI D. None of the Above

491. By converting and sending the electrical signals to the equipment, _____ may control the equipment, like closing or opening a valve or a switch, or setting the speed of the pump.
A. RTU C. SCADA system
B. HMI D. None of the Above

492. A 'supervisory Station' refers to the software and servers responsible for communication with the field equipment (PLCs, RTUs etc.), and after that, to _____ software running on the workstations in the control room, or somewhere else.
A. RTU C. SCADA system
B. HMI D. None of the Above

493. Which of the following terms can have multiple servers, disaster recovery sites and distributed software applications in larger SCADA systems?
A. Master station C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above

494. For increasing the system integrity, _____are occasionally configured in hot standby or dual-redundant formation, providing monitoring and continuous control during server failures.
A. Multiple servers C. Multiple stations
B. Independent systems D. None of the Above

495. Which of the following terms originally used modem connections or combinations of direct and radio serial to meet communication requirements, even though IP and Ethernet over SONET/SDH can also be used at larger sites like power stations and railways?
A. SCADA systems C. SCADA
B. SCADA implementation(s) D. None of the Above

496. The monitoring function or remote management of the _____ is referred to as telemetry.
A. SCADA operator C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above

497. An important part of most SCADA implementations is _____. The system monitors whether certain alarm conditions are satisfied, to determine when an alarm event has occurred.
A. Policies and procedures C. Alarm handling
B. The cyber security team D. None of the Above

498. Once an alarm event has been detected, one or more actions are taken (such as the activation of one or more alarm indicators, and perhaps the generation of email or text messages so that management or _____are informed).
A. SCADA operator C. Remote SCADA operators
B. SCADA implementation(s) D. None of the Above

499. In many cases, a _____ may have to recognize the alarm event; this may deactivate some alarm indicators, whereas other indicators remain active until the alarm conditions are cleared.
A. SCADA operator C. SCADA
B. SCADA implementation(s) D. None of the Above

500. Which of the following terms might automatically monitor whether the value in an analogue point lies outside high and low- limit values associated with that point?
A. SCADA operator C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above