Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Level : B.E.
Year : IV

Course : EPEG 422
Semester: I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date MAR 1 2 2018

SECTION "A"
[20 Q. × 0.5 =10 marks]

Choose the most appropriate answer.

1. The armature voltage of a dc motor can be controlled by means of
   a. Cycloconverters
   b. Inverters
   c. AC-DC converters
   d. Bridge rectifier circuit with fixed input

2. The speed of a dc motor can be increased by
   a. Increasing the thyristor firing angle in the armature circuit of a phase controlled converter.
   b. Decreasing the thyristor firing angle in the armature circuit of phase controlled converter.
   c. Increasing the duty cycle of a chopper.
   d. Decreasing the duty cycle of a chopper.

3. A freewheeling diode in a phase controlled converter
   a. Increases the chances of discontinuous conduction in the load.
   b. Decreases the chance of discontinuous conduction in the load.
   c. Causes the chance of discontinuous conduction in the load.
   d. Has no effect in the circuit.

4. The speed of a dc shunt motor below and above normal speed can be controlled by
   a. Armature voltage control method.
   b. Flux control method.
   c. Armature voltage control and flux control method respectively.
   d. Flux control method and armature voltage control method respectively.

5. For controlling the speed of a dc motor of 150 hp rating, the following types of converters are normally used
   a. Single phase full converters
   b. Single phase dual converters
   c. Three phase full converters
   d. Three phase dual converters

6. A motor armature supplied through phase controlled SCRs receives a smoother voltage shape at
   a. Higher motor speeds
   b. Low motor speeds
   c. Rated normal motor speeds
   d. Zero speed

7. A dual converter used for the speed control of dc motors, will have two bridges
   a. Two rectifiers
   b. Two inverters
   c. One rectifier and one inverter
   d. Two rectifiers and two inverters

8. A dc chopper circuit controls the average voltage across the dc motor by
   a. Controlling the input voltage.
   b. Controlling the field current.
   c. Controlling the line current.
   d. Controlling switching of the motor for fixed durations of t_{on} and t_{off} respectively.

9. For controlling the speed of a three phase induction motor, the method generally employed is
   a. Fixed voltage fixed frequency method.
   b. Variable voltage fixed frequency method.
   c. Variable voltage variable frequency method.
   d. Fixed voltage variable frequency method.

10. Variable voltage fixed frequency method can be obtained from
   a. Three phase cycloconverter b. AC chopper
   c. DC chopper d. Inverter

11. The slip power recovery method for the speed control of slip ring induction motor
   a. Increases the efficiency b. Decreases the efficiency
   c. Improves the power factor d. Degrades the power factor

12. In ac motor control the ratio of voltage to frequency is maintained at constant value
   a. To make maximum use of magnetic circuit.
   b. To make minimum use of magnetic circuit.
   c. To maximize the current drawn from the supply to provide torque.
   d. To minimize the current drawn from the supply to reduce torque.

13. A three phase induction motor develops a torque as a function of slip when supplied from a fixed voltage at constant frequency and operates in motoring region of operation for the following value of slip
   a. $0 \leq s \leq 1$ b. $s < 0$ c. $1 \leq s \leq 2$ d. $s > 2$

14. A 3 phase, 4 pole 400V, 15 kW, 1440 rpm, 50 Hz, star connected induction motor has rotor leakage impedance of $0.4+j1.6\Omega$. If this motor is energized from 120 Hz, 400V, 3 phase source, then maximum torque is
   a. 55.262 Nm b. 99.5 Nm c. 50 Nm d. 27.6 Nm

15. The induction motor is said to be operated in field weakening mode on _____ control method in a.c. drive
   a. Stator voltage b. Stator frequency
   c. Stator voltage and frequency d. Stator current

16. For a cylindrical rotor synchronous motor, the pull-out torque is obtained when the load angle is at
   a. 45^0 b. 90^0 c. 180^0 d. 270^0

17. The developed torque from the salient pole motor is
   a. $(E_f V_t / X_d)*\sin\delta$.
   b. $(E_f V_t / X_d)*\sin\delta + (V_t^2 /2) *[1/X_q-1/X_d]*\sin2\delta$.
   c. $(V_t^2 /2) *[1/X_q-1/X_d]*\sin2\delta$.
   d. $(E_f V_t / X_d)*\sin\delta + (V_t^2 /2) *[1/X_q-1/X_d]*\sin\delta$.

18. The developed torque from the salient pole motor is due to
    a. Electromagnetic torque only.
    b. Reluctance torque only
    c. Combination of electromagnetic and reluctance torque.
    d. Difference of electromagnetic and reluctance torque.

19. In comparison to salient pole motor permanent magnet synchronous motor has
    a. Higher pull out torque.
    b. Higher efficiency.
    c. Higher pull out torque and higher efficiency.
    d. Increased losses.

20. An alternator is connected to an infinite busbar. Its excitation is decreased while its driving power remains constant. This will result in
    a. Less leading power factor.
    b. More leading power factor.
    c. Terminal voltage drop.
    d. Terminal voltage increase.

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SECTION "A"
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Tick the most appropriate answer.

1. In a hydro-electric power plant, spillways are used _____
   [ ] to discharge all surplus water
   [ ] to discharge surplus water on the downstream side of dam
   [ ] water is not available in sufficient quantity
   [ ] none of the above

2. The annual depreciation of a hydro power plant is about _____
   [ ] 0.5 % to 1.5 %
   [ ] 10 % to 15 %
   [ ] 15 % to 20 %
   [ ] 20 % to 25 %

3. The power output from a hydro-electric power plant depends on three parameters _____
   [ ] head, type and dam of discharge
   [ ] head, discharge and efficiency of the system
   [ ] efficiency of the system, type of draft tube and type of turbine used
   [ ] type of dam, discharge and type of catchment area

4. Earthen dams are
   [ ] rigid dams [ ] non rigid dams [ ] overflow dams [ ] diversion dams

5. The 'safety valve' of a dam is its
   [ ] drainage gallery [ ] inspection gallery [ ] spillway [ ] outlet sluices

6. The head loss in the flow of the water through a penstock pipe of given length
   [ ] increase with the increase in flow velocity
   [ ] decrease with the increase in the flow velocity
   [ ] decrease with the increase in the roughness of the pope surface
   [ ] decrease with time

7. If the peak load on a power plant having a capacity of 100 MW is 70 MW during a given week, and the energy produced is 58,80,000 kWh, the capacity factor for the plant for the week, will be:
   [ ] 35 % [ ] 50 % [ ] 70 % [ ] 75 %

8. Pondage requirement in a hydropower plant includes the need
   [ ] to balance the varying demand [ ] to compensate for wastage and spillage
   [ ] to balance short time fluctuations in the flow [ ] all of the above

9. Plant capacity factor depends on
   [ ] load factor [ ] plant capacity [ ] storage [ ] all of the above

10. DC system is required in hydropower plant for _____ function.
[ ] closure, tripping and control of main switchgear
[ ] turbine control, indication and shutdown
[ ] emergency lighting
[ ] all of the above

11. Hydro generators are low speed salient pole type machines. Power factor are usually
[ ] 0.90 to 0.95 lagging
[ ] 0.80 to 0.85 lagging
[ ] 0.90 to 0.95 leading
[ ] 0.80 to 0.85 leading

12. Sizing of power house means
[ ] fixing of length, width and height of power house
[ ] fixing of length, width, height and number of unit
[ ] fixing of length, width, height of power house and size of MIV
[ ] fixing of length, width, height of power house, size of rotor & MIV

13. The deflection angle of the branching pipes is generally
[ ] 10 to 30 degree
[ ] above 80 to 90 degree
[ ] 30 to 75 degree
[ ] less than 10 degree

14. The hydraulic load acting on the intake gate of clear opening 2 x 2.5 m^2 (H x W) subjected to head of 8.9 m is
[ ] 39.5 ton [ ] 39.5 kN [ ] 4000 N [ ] 90 ton

15. Under sluice stop-log are located at
[ ] U/S of under sluice gate
[ ] depends on the size of gate
[ ] D/S of under sluice gate
[ ] depends on types of gate hoisting

16. Rope drum hoisting is selected if
[ ] positive thrust is required for gate closure
[ ] gate height is more than gate width
[ ] frictional force exerted on gate is more than gate weight
[ ] gate self-weight is enough for gate closure

17. Expansion joints are generally installed
[ ] between saddle support
[ ] at any location in the pipe
[ ] between anchor block
[ ] at upstream of saddle

18. Generator capacity of Kulekhani-I hydropower plant is
[ ] 2 × 35 MVA, PF 0.85
[ ] 2 × 40 MVA, PF 0.85
[ ] 2 × 18.8 MVA, PF 0.85
[ ] 2 × 20 MVA, PF 0.85

19. Which of the following hydropower project with penstock started from the Forebay in Nepal?
[ ] Marsyangdi HPP
[ ] Sunkoshi HPP
[ ] Kulekhani II,
[ ] Kulekhani I HPP

20. Rated voltage for 501 to 2500 kW is
[ ] 3.3 kV [ ] 6.6 kV [ ] 11 kV [ ] 415 V