Code. No: 11005/BL

FACULTY OF ENGINEERING

B.E.I-Year (Backlog) Examination, May / June 2019

subject: Engineering Chemistry

Time: 3 Hours **Max. Marks: 75**

Note : Answer all questions from part – A and any five questions from Part-B

PART– A (25 Marks)

1. Calculate the electrode potential of copper electrode at 25^{o} C, if $[CuSO_4]$ = 0.001M and $E^{o}_{Cu+2/Cu}$ = 0.340V . (2)
2. What is Ni-Cd battery? Explain. (3)
3. Explain the waterline corrosion. (2)
4. Explain the alkanity of water and give units of hardness. (3)
5. Classify the polymers and give one example each. (2)
6. Explain the preparation of Bakelite. (3)
7. Write the Dulong's formula for the calculation of calorific value. (2)
8. Explain the terms i) Octane number ii) Cetane number. (3)
9. Classify the liquid crystals. (2)
10. Explain i) saponification number ii) acid value. (3)

PART–B (50 Marks)

11. a).write the representation and electrode reactions of i) SHE ii) SCE in . reduction and anidation processes. (5)
    b). Write a note on Methanol-Oxygen fuel cell and its cell reactions. (5)

12. a). Explain the different mechanisms of electrochemical corrosion. (5)
    b). Write the determination of hardness of water by EDTA method (5)

13. a).Classify the conducting polymers and explain the conduction in polyacetylene. (5)
    b). Differentiate thermoplastics and thermosetting resins. (5)

14. a). Explain ultimate analysis of coal and its importance. (5)
    b). write the principle of rocket propulsion and characteristics of good propellant. (5)

15. a).Explain the mechanism of lubrication and give functions of lubricants. (5)
    b).Explain the application of phase rule equation to water system (5)
16. a) Write the representation of redox electrode and give its electrode reaction in reduction process. (5)
    b). What is cathodic protection? Explain the impressed current cathodic protection method. (5)

17. a). What is cracking? Explain the catalytic cracking by moving bed method. (5)
    b). A sample of coal was found to contain the following composition. C= 80%, H= 5%, O = 1%, N = 2% and ash = 12%, Calculate minimum amount of air required for complete combustion of 1kg coal sample. (5)

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Code: 11368/BL

FACULTY OF ENGINEERING

B.E / B. Tech. (Bridge Course) II–Semester (Backlog) Examination, May /June 2019

Subject: Mathematics

Time: 3 Hours **Max. Marks: 75**

Note: ***Answer all questions from Part-A & answer any five questions from Part-B.***

Part – A (25 Marks)

1. Define mean, median and mode. (3)
2. State addition and multiplication law of probability. (2)
3. State Roll's theorem. (3)
4. Write the radius of curvature for the parametric equations $x = f(t)$ and $y = \ddot{}(t)$ (2)
5. Find the area of the region enclosed between the curves $y = \sqrt{x}$ and $y = x^2$ (3)
6. State mean value theorem of integrals. (2)
7. Find $divF$ if $F = grad\left(x^3 + y^3 + z^3 - 3xyz\right)$ (2)
8. Find the directional derivative of $\ddot{} = 5x^2y - 5y^2z + 2.5z^2x$ at the point $(1,1,1)$ in the direction of the line $\frac{x-1}{2} = \frac{y-3}{-2} = z$ (3)
9. Define error function and its properties. (2)
10. Find the value of $\left(\frac{1}{2}, \frac{1}{2}\right)$ (3)

Part – B (50 Marks)

11. A and B throw alternatively a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins find his chance of winning. (10)
12. If $f(x) = \log(1+x).\ x > 0$ using Meclaurin's theorem, show that for $0 < \bar{} < 1$,
$\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3(1+\bar{})^3}$. Deduce that $\log(1+x) < x - \frac{x^2}{2} + \frac{x^3}{3}$ for $x > 0$ (10)
13. The part of lemniscates $r^2 = 2a^2\cos 2\bar{}$, $0 \le \bar{} \le \frac{®}{4}$ revolves about the x-axis. Find the surface area of the solid generated. (10)
14. If and have their usual meanings and is the constant vector, prove that
$\nabla x\left(\frac{A.R}{r^n}\right) = \frac{2-n}{r^n}A + \left(n.\frac{A.r}{r^{n+2}}R\right)$ (10)
15. Verify divergence theorem for $F = \left(x^2 - yz\right)\hat{i} + \left(y^2 - xy\right)\hat{j} + \left(z^2 - xy\right)\hat{k}$ taken over the rectangular parallelepiped $0 \le x \le a,\ 0 \le y \le b,\ 0 \le z \le c$. (10)

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16. Prove that (i) $(p,q)=\int_0^{\infty}\frac{y^{q-1}}{(1+y)^{p+q}}dy$ (5)

(ii) $(p,q)=\int_0^{1}\frac{x^{p-1}+x^{q-1}}{(1+x)^{p+q}}dx$ (5)

17. Show that for any positive integer (i) $\int_0^{\frac{\pi}{2}}\sin^{2m-1}\theta\,d\theta=\frac{(2m-2)(2m-4).....2}{(2m-1)(2m-3).....3}$ (5)

ii) $\int_0^{\frac{\pi}{2}}\sin^{2m-1}\theta\,d\theta=\frac{(2m-1)(2m-3).....1.}{(2m)(2m-2).....2}\frac{\pi}{2}$. (5)

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